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WAR MACHINE

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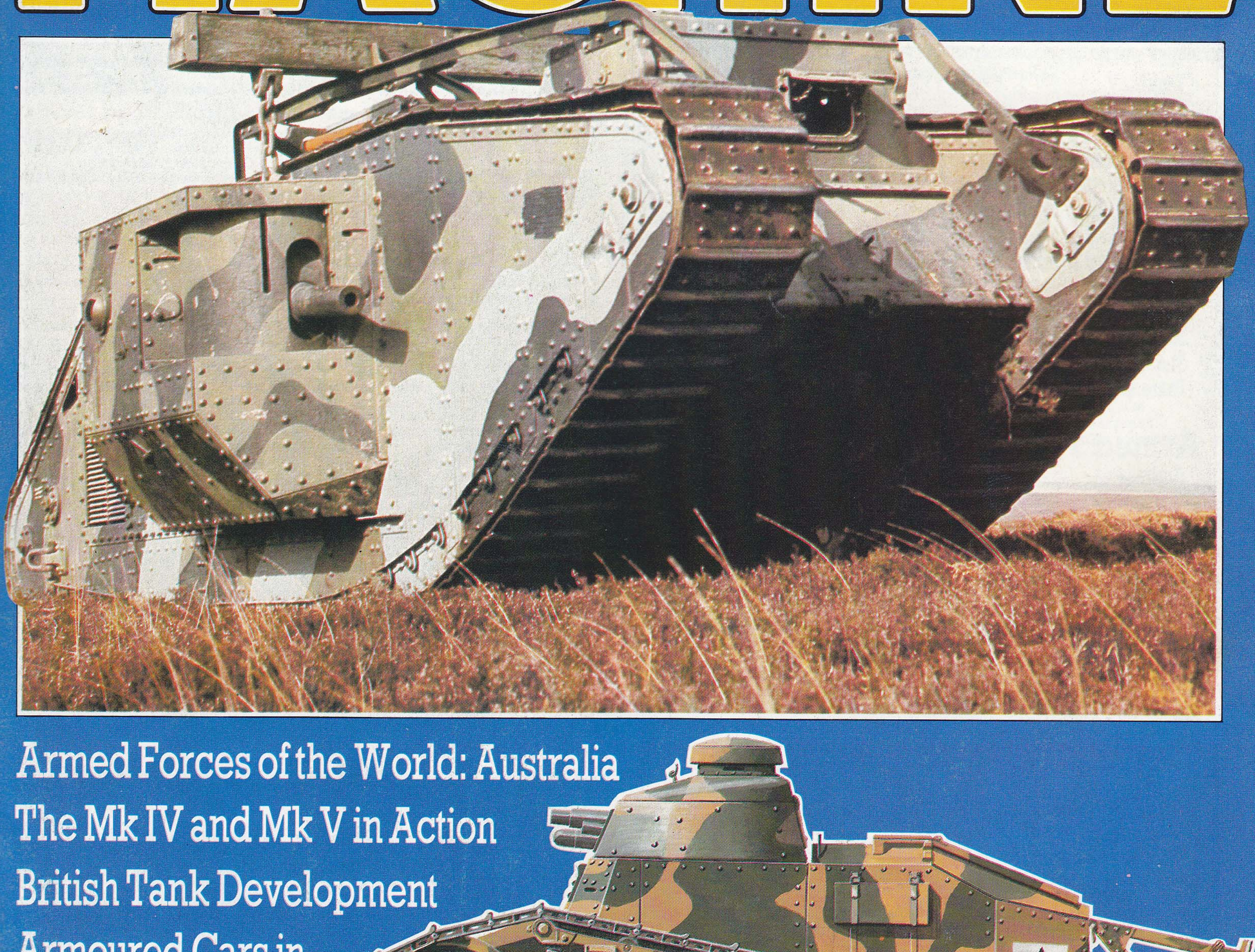

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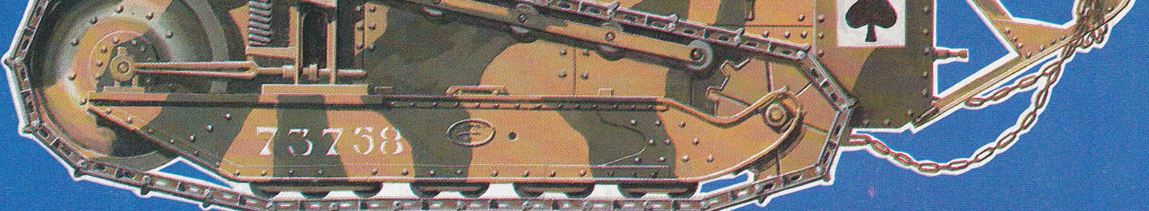

A fully illustrated guide to Armoured Vehicles of World War I

WAR MACHINE

Volume 3 **Issue 31**

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Armed Forces of the World

Australia iii

Published by
Orbis Publishing Ltd

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London W4 4PH

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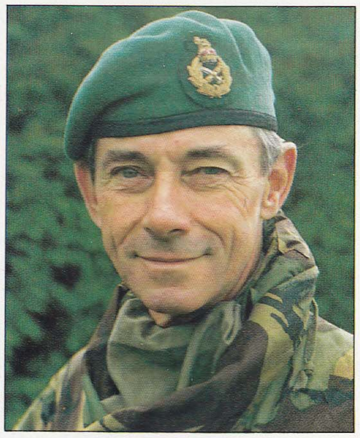
Colour Origination: Imago Publishing Ltd, Thame, Oxon
Typesetting: SX Composing Ltd
Film work: Precise Litho Ltd



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5844

Printed in Great Britain by The Artisan Press Ltd

Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711
Circulation Director: David Breed
Marketing Director: Michael Joyce

WAR MACHINE
Price UK 80p. IR £1. Aus $1.95. NZ $2.25. SA R1.95. Singapore $4.50. USA and Canada $1.95

How to obtain your copies of WAR MACHINE: Copies are obtainable by placing a regular order at your Newsagent, or by taking out a subscription.

Subscription Rates
For six months (26 issues) £23.80; for one year (52 issues) £47.60. Send your order and remittance to Punch Subscription Services, Watling Street, Bletchley, Milton Keynes, Bucks MK2 2BW, being sure to state the number of the first issue required.

Back Numbers
UK & Eire: Back numbers are obtainable from your Newsagent or from WAR MACHINE Back Numbers, Orbis Publishing Limited, 20-22 Bedfordbury, London WC2N 4BT at cover price.
Australia: Back numbers are obtainable from WAR MACHINE Back Numbers, Gordon & Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Vic 3001.
South Africa, Europe, Malta and New Zealand: Back numbers are available at cover price from your Newsagent. In case of difficulty write to the address in your country given for binders. South African readers should add sales tax.

How to obtain binders for WAR MACHINE
UK & Eire: Send a cheque or Postal Order for £3.95 per binder (incl p & p) payable to Orbis Publishing Ltd to WAR MACHINE Binders, Orbis House, 20-22 Bedfordbury, London WC2N 4BT
Europe: Write with remittance of £5.00 per binder (incl p & p) payable to Orbis Publishing Ltd to WAR MACHINE Binders, Orbis House, 20-22 Bedfordbury, London WC2N 4BT.
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South Africa: Binders are available through any branch of Central News Agency. In case of difficulty write to WAR MACHINE Binders, Intermag, PO Box 57394, Springfield 2137.

Note: Binders and Back Numbers are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the **UK market only** and may not necessarily be identical to binders produced for sale outside the UK. Binders and issues may be subject to import duty and /or local taxes, which are not included in the above prices unless stated.

The WAR MACHINE published by Orbis Publishing Ltd has no connection with the WAR MACHINE published by Emjay. The latter is a magazine devoted to computer simulation gaming and further information and subscription details can be obtained from Emjay, 17 Langbank Avenue, Rise Park, Nottingham NG5 5BU, England.

Picture acknowledgements
Cover photograph: T.J. **601-620:** Imperial War Museum. **(iii):** Australian MoD/Australian MoD. **(iv):** Australian MoD.

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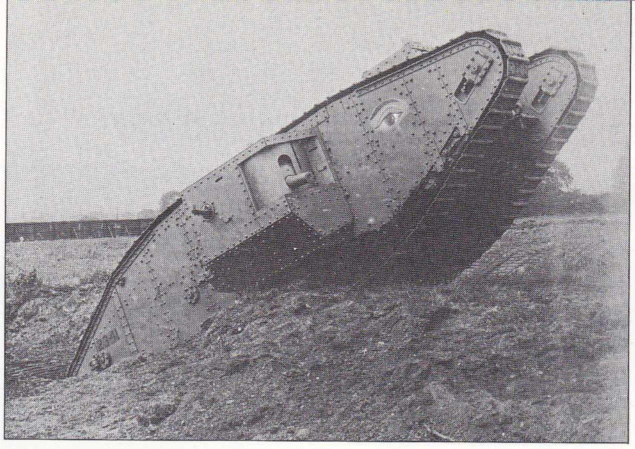
Armoured Vehicles of World War 1



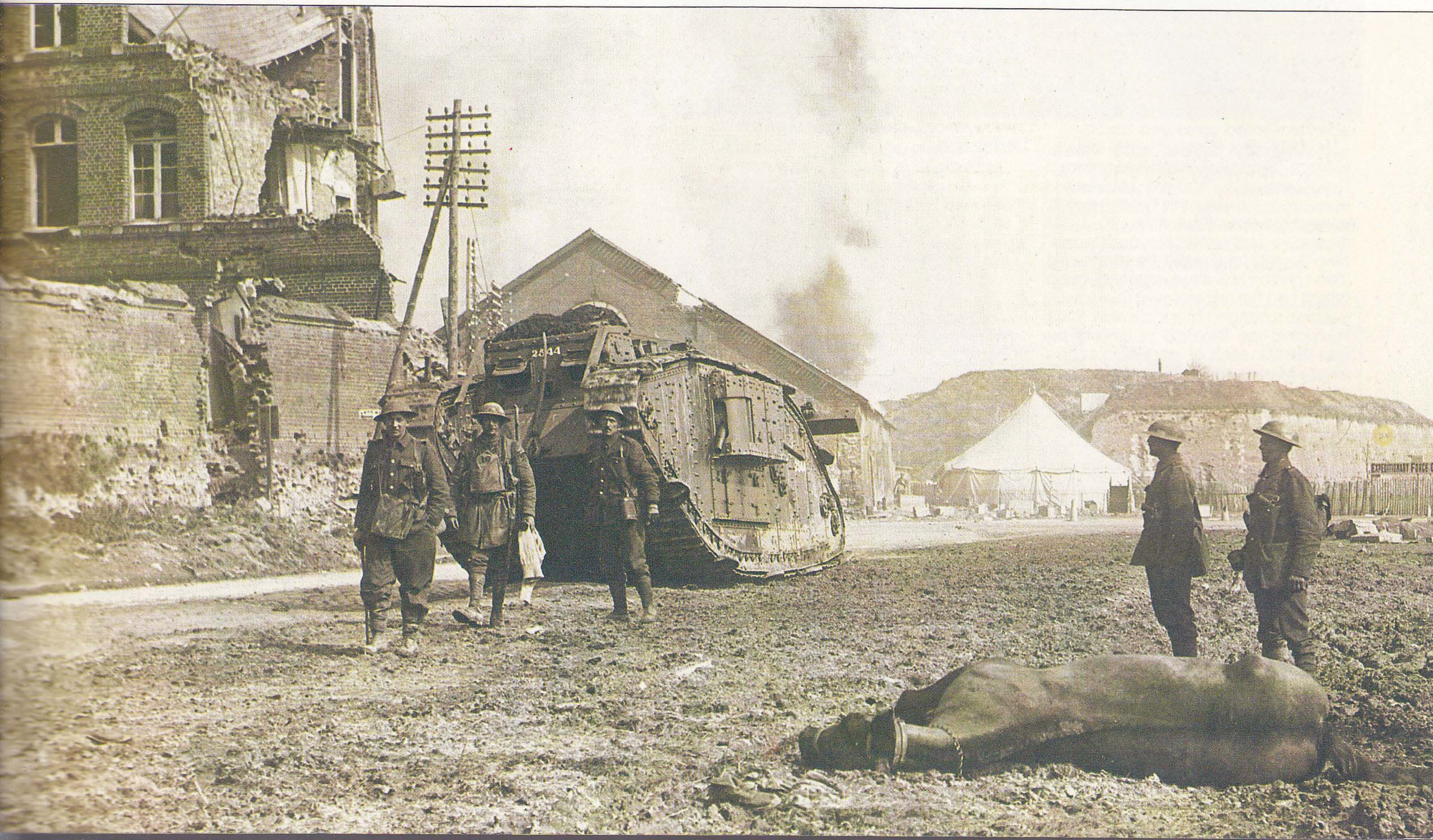
A Tank Mk IV (Male) with short 6-pdr guns displays the 'No have eyes, how can see?' insignia possibly bestowed by Chinese labourers in France. This tank was presented to the Tank Corps by the President of the Federal Council of the Malay States.

Armoured vehicles of World War I were not particularly good as fighting machines. Wheeled vehicles could not handle the terrain, and those using the recently-invented continuous track were slow and prone to breakdown. Yet the German High Command were to claim in 1918 that armoured vehicles, particularly the tank, were a major factor in the Allied victory.

The weapon that was to become widely known as the tank was virtually forced upon the armies of World War I by the very nature of the terrain over which the embattled armies had to operate. After the end of 1914 the war settled down to what was practically a siege campaign, but on a scale that no one had ever conceived possible. The German army and its French and British opponents faced each other across a strip of country in northern France that was swept by the firepower produced by the machine-gun and massed artillery. The opposing armies lived a miserable life in their trenches and dugouts, and from time to time made an effort to break the stalemate by laying on mass attacks presaged and supported by huge artillery concentrations. It was all to no avail.

Every time an attempt was made by either side to cross the contested strip of land known as the Western Front the result was slaughter on a massive scale. No matter how intensive or how thorough the artillery's preparatory bombardment, there was always a flank from which machine-gun fire could be delivered and there was always a machine-gun somewhere that was able to survive the shell-fire. To the soldiers of the day there seemed to be no answer to this deadlock and all they could contrive was to make the preparatory bombardment that much more intense and concentrated. But the machine-gun always survived and the casualty tolls continued to lengthen.

The answer to all this destruction of life was so straightforward that we now wonder why it was neglected so long. The answer was a simple layer of armour plate and light armament carried on a powered chassis that we now call the tank. These new vehicles had to be able to cross the devastated terrain that the French country had become between the lines, cross the deep trenches in which the hapless infantry lived and died, and get through to the open country beyond. Once the tanks had got there, the theorists proposed, fluid warfare and the destruction of the enemy could progress once more. What those proponents did not realize was that they had created a new weapon with which all future wars were to be fought.



A Tank IV (Female) in the ruined streets of Peronne during the German attacks of March 1918. The small sponsons for the machine-guns can be clearly seen, and the tank carries an unditching beam over the rear tracks; this was used to help the vehicle clear a trench if it was unable to do so using the tracks alone.

BELGIUM

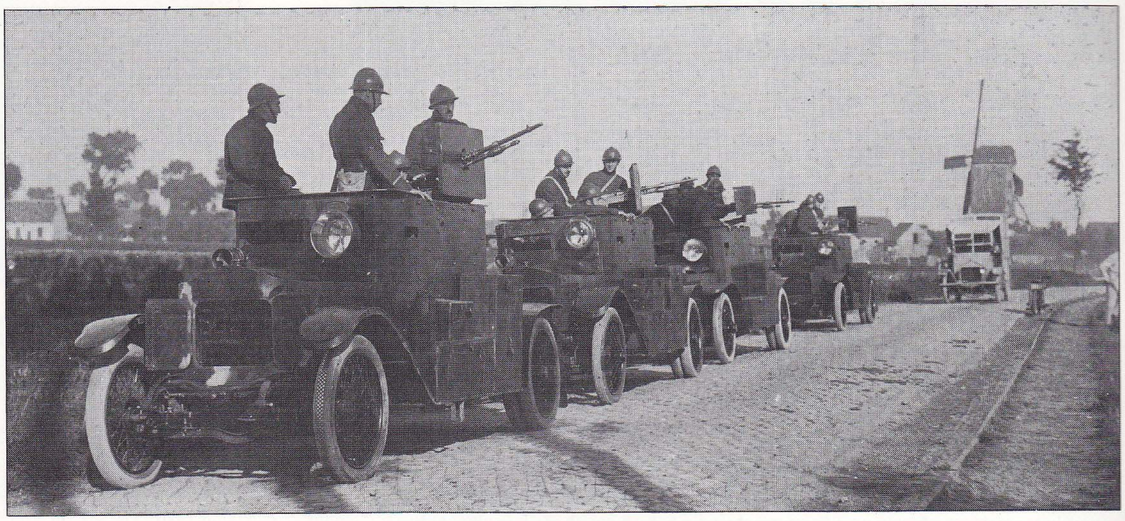
Minerva armoured car

The story of the Belgian **Minerva** armoured cars is now little known outside Belgium, which is a pity as in many ways the Belgians were the progenitors of armoured car warfare and demonstrated to others how such vehicles could be used, so anticipating a type of mobile combat that was not to realize its full form until World War II.

Almost as soon the Germans invaded Belgium in August 1914 cavalry sweeps ahead of the main body of the German army were encountered by the Belgians. Usually the Germans heavily outnumbered the Belgians, who soon took to using the mobility of the motor car as a counter against German numbers. By the end of the month two Minerva touring cars were provided with improvised armour at the Cockerill works at Hoboken and sent into action. These early cars were simply commercial models with sheets of 4-mm (0.16-in) armour plating around the engine and sides, and with the top left open for a Hotchkiss machine-gun mounting. Before very long the first two cars were followed by further examples with a more formal armoured hull but retaining the same basic layout. With this small force the Belgians showed what armoured cars could do: acting originally as a form of motorized cavalry they carried out long reconnaissance missions, gathered intelligence of the enemy's movements, gave fire and other support to infantry attacks when possible, and also carried out long disruption missions behind the lines of the German advance. It was perhaps the last type of mission that attracted most attention, for at that stage of the war the Germans were advancing or marching in open order across open country or along roads. The single machine-gun of a Minerva armoured car could create havoc in such conditions, and frequently did just that.

But this period did not last long. By October 1914 the line of trenches had reached the Yser region, and there the Belgian army remained until 1918. The area was too wet and boggy for armoured cars to achieve anything useful and their period of immediate action passed. But during the few weeks they had been in action they had demonstrated to all who cared to learn what the armoured car could achieve. The Belgian example was copied directly by the British Royal Naval Air Service squadrons and the Germans also went ahead with their own designs for armoured cars.

While the Western Front was 'out' as far as Belgian armoured car units were concerned, a special Belgian armoured car unit was formed for service in Russia against the Germans. There the Belgian cars performed sterling service until they were shipped home in 1918. Once back in Belgium the units re-equipped, and in 1919 there appeared yet another version of the basic Minerva armoured car, this time with an armoured turret. But the old 1914 Minervas were retained in service, usually for use by the Gendarmerie, with which some were still in use as late as 1933.



A section of Belgian Minerva armoured cars operates near Houthem in September 1917. The cars are all armed with Hotchkiss machine-guns, and the design had by 1917 been sufficiently formalized for spotlights to become standard.

Specification

Minerva
Crew: 3 to 6
Weight: 4 tons
Powerplant: one unknown petrol engine
Dimensions: length 4.90 m (16 ft 1 in); width 1.75 m (5 ft 9 in); height 2.30 m (7 ft 6½ in)
Performance: maximum speed 40 km/h (25 mph); range not known

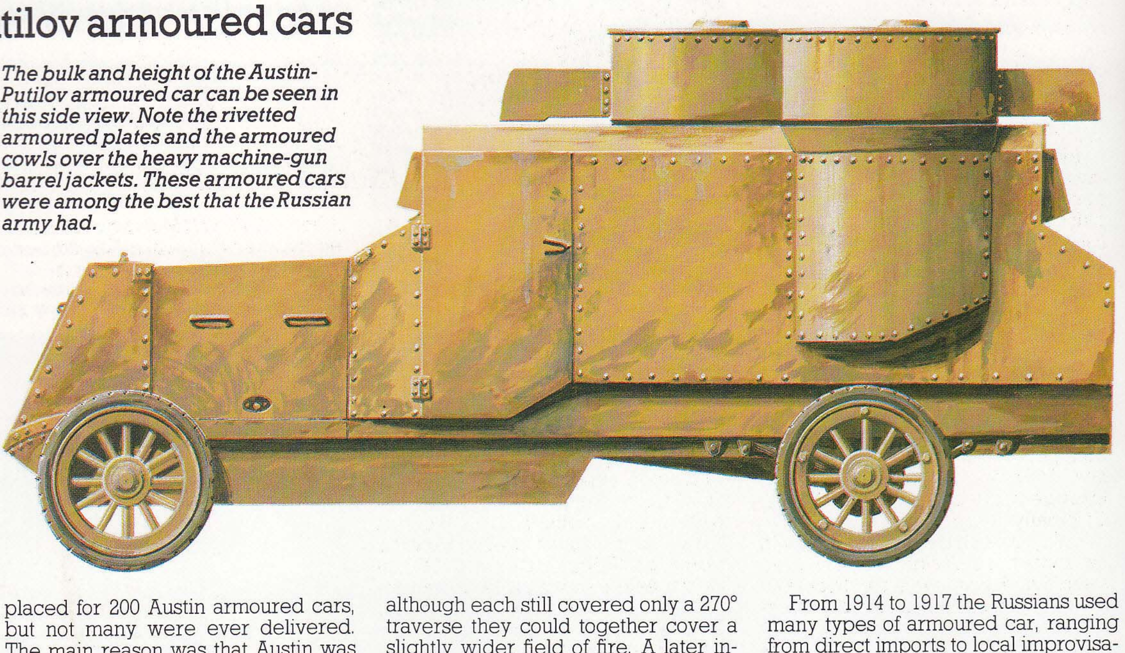
UK/RUSSIA

Austin-Putilov armoured cars

Although the vehicles known as the **Austin-Putilov** armoured cars had British origins they may be assumed to be Russian, as most of them were produced and used there; another point is that their size was such that they might also be termed armoured trucks.

In 1914 the Russian army was so short of equipment that it had to turn to the United Kingdom to supply armoured cars. Various types were involved but one of these was an Austin design, a fairly massive design with twin turrets and solid-tyred wheels. Two types of hull were supplied, one of which had the armour over the driver's position arranged in such a way that it restricted the traverse of both of the gun turrets, each of which mounted a single Maxim machine-gun. This early arrangement was soon altered in favour of a lower cab, but on this model the weight was increased by 1.16 tons. This weight increase was brought about mainly by the use of thicker (maximum 8 mm/0.315 in) chrome-steel armour and a revision of the driving arrangements. The original British design could be steered from the front only, but the Russians wanted steering from the rear as well and the revisions required to accommodate this requirement added to the weight. This was not the only rearrangement demanded by the Russians, who soon found that the harsh Russian conditions were too much for the British vehicles, which broke down frequently.

The bulk and height of the Austin-Putilov armoured car can be seen in this side view. Note the rivetted armoured plates and the armoured cowls over the heavy machine-gun barrel jackets. These armoured cars were among the best that the Russian army had.

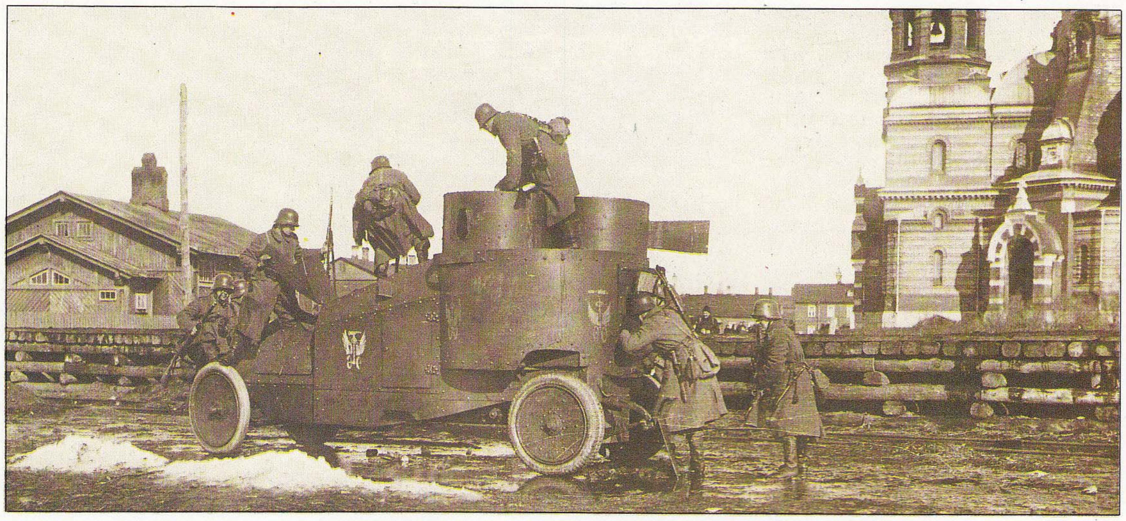


Despite such problems orders were placed for 200 Austin armoured cars, but not many were ever delivered. The main reason was that Austin was already stretched to the limit to supply vehicles for the British army and had few facilities to spare for the Russians. Instead of complete armoured cars they supplied bare chassis instead direct to the Putilov works, where the Russians were able to add whatever strengthening they thought necessary and make some of their own modifications to the hull. This mainly involved staggering the twin turrets so that although each still covered only a 270° traverse they could together cover a slightly wider field of fire. A later innovation was the introduction of tracks in place of the rear wheels which converted the vehicle into a half-track; eventually Putilov ceased production of the armoured cars at its St Petersburg plant and concentrated on the half-track version. There was even a plan to produce half-tracks in place of any more armoured cars but the revolution of 1917 occurred before this could be carried out.

From 1914 to 1917 the Russians used many types of armoured car, ranging from direct imports to local improvisations, but the most important type was the Austin-Putilov. It was numerically and mechanically the best the Russians had to hand and eventually proved to be far more suited to the rough conditions under which the Russians had to fight. During 1917 many became involved in the internal fighting that accompanied the events leading to the October Revolution, and the type can frequently be seen in photographs of the period. Some were used by Poland after 1918 and a few even ended up in Japan.

Specification

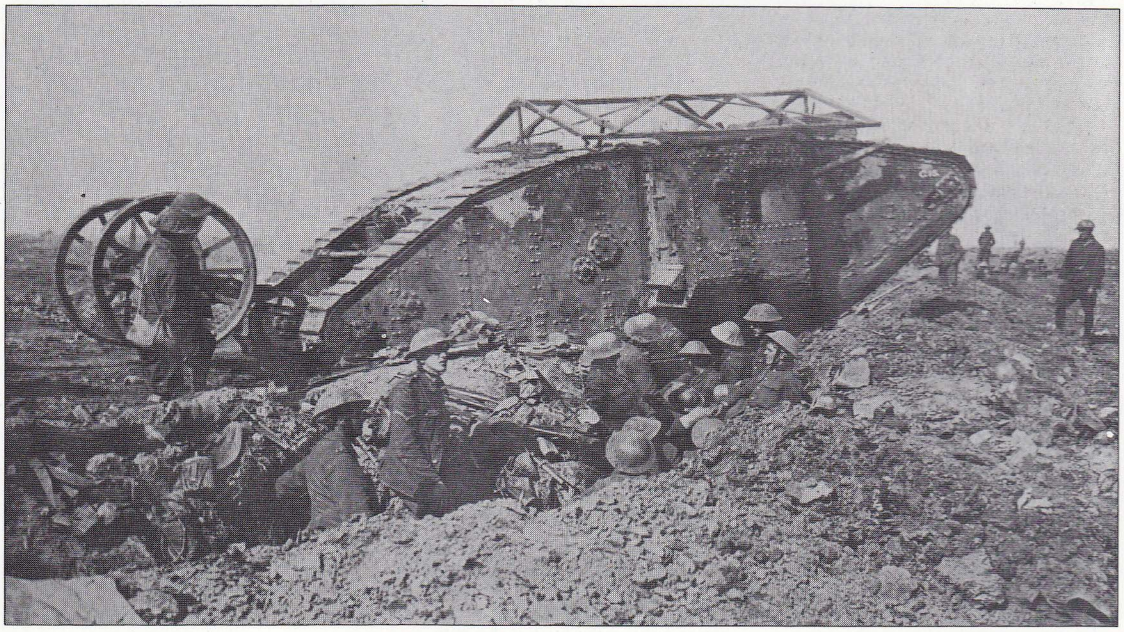
Austin-Putilov
Crew: 5
Weight: 5.3 tons
Powerplant: one 50-hp (37.3-kW) Austin petrol engine
Dimensions: length 4.88 m (16 ft 0 in); width 1.95 m (6 ft 4¾ in); height 2.40 m (7 ft 10½ in)
Performance: maximum speed 50 km/h (31 mph); range 200 km (125 miles)



German troops examine a captured Austin-Putilov armoured car, probably in search of loot. Note the prominent Czarist insignia and the height of these vehicles, which can be assessed by comparison with the soldiers standing around.

UK

Tank Mk I



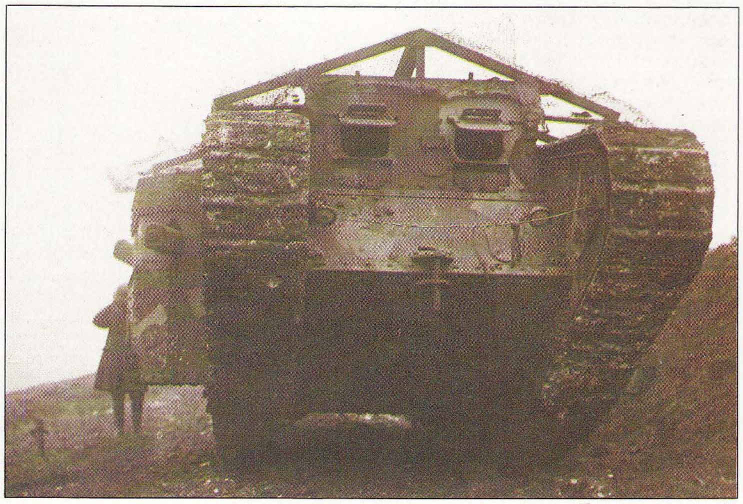
Above: A Tank I (Male) moves up into action near Thiepval in September 1916. Items to note are the anti-grenade wire mesh screen over the hull and the clumsy steering 'tail' at the rear; these steering devices were discarded after a short while as they proved to be of limited value.

There is no space in these pages to provide a full account of the development of the vehicles that led to the **Tank Mk I**. Suffice to say that the Mk I was the production and service model of the prototype vehicle known as 'Mother', which was the eventual outcome of a series of development models that were originally based on the use of a Holt tractor chassis. By the time 'Mother' was produced, the original Holt design had been submerged by operational requirements that called for prodigious trench-crossing capabilities that the Holt concept could never achieve. Lieutenant W.G. Wilson was in the main responsible for the final design of 'Mother' after a great deal of committee and experimental work, and it was he who conceived the idea of using the large and high track outline with its characteristic shape that came to be the classic tank outline of World War I.

'Mother' was demonstrated in January and February 1916, and soon after this the first production order was placed. A separate arm was established in March 1916 to use the new vehicle, which was named the 'tank' purely as a cover, though the name stuck and is still in use. The first production vehicles were issued to the Heavy Section, Machine-Gun Corps in mid-1916, and the first crews were assembled and trained. The Tank Mk I was a large and heavy beast powered by a single Daimler 105-hp (78.3-kW) petrol engine carried in an armoured box slung between the two massive lozenge-shaped continuous tracks. Originally it had been intended to mount a turret on the top but this would have made the design unstable so instead the main armament of two 6-pdr (57-mm) guns was placed in one sponson on each side. The sponsons each had a single Lewis or Hotchkiss machine-gun, and a third such gun was fitted for extra defence. The 6-pdr (57-mm) guns were ex-Admiralty weapons as the army would not supply an armament when requested. The vehicle was protected by armour plate (ranging in thickness from 6 mm/0.24 in to 12 mm/0.47 in) riveted to steel joists, but in action this proved unsatisfactory as bullet 'splash' found its way through the armour seams and caused casualties so that the crews took to wearing chain mail facial armour. The Tank Mk I could cross trenches up to 2.44 m/8 ft wide, and steering was at first accomplished by using external twin-wheel 'steering tails' that proved to be unnecessary: in action they were frequently damaged, yet the tanks could still be steered.

Almost as soon as the first tanks appeared in France in mid-1916 they were ordered into action, despite the fact that the vehicles were still full of mechanical 'bugs' and their crews were barely trained. Thus the first Tank Mk Is went into action on the morning of 15 September 1916 at Flers-Courcelette in a vain attempt to provide some impetus to the flagging Somme Offensive that had been under way since July. Although they were used locally in ones and twos, the tanks did manage to make some local breakthroughs and created panic when they appeared. But the sad truth was that too few actually got into action. Many of the planned 50 that were supposed to make the attack simply broke down on their way to the front, and others were quickly bogged down in the mud that prevailed everywhere. Individual tanks did make deep impressions into

Below: This Tank Mk I (Female) was photographed coming out of the battle near Flers-Courcelette on 15 September 1916 after the first-ever tank action took place there. Note the armoured cowls over the machine-guns and the frame for the anti-grenade screen.



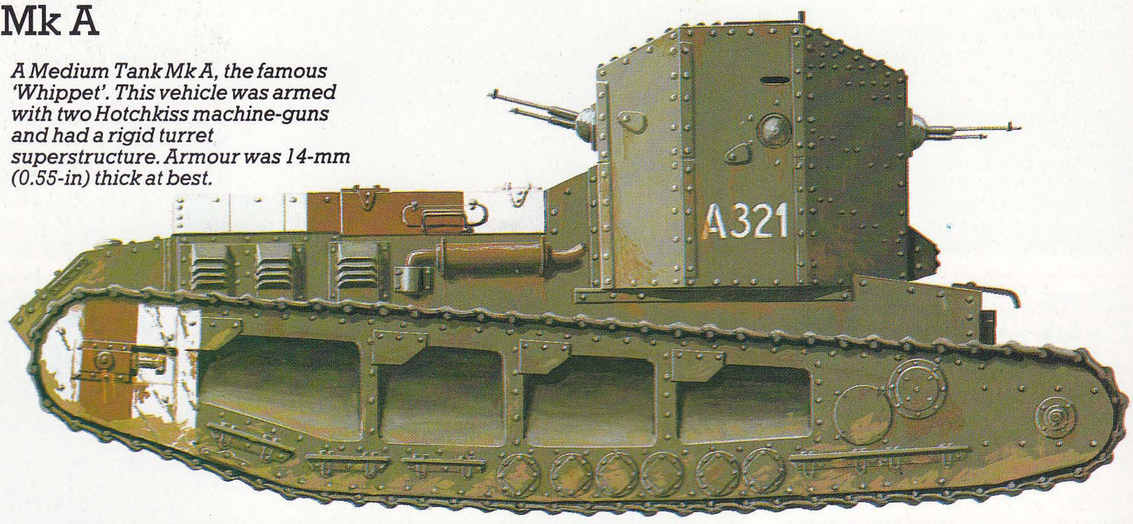
the German line but they were too few in number to make any major impact. The Mk I was produced in two versions: the **Tank Mk I (Male)** described above, and intended for the primary offensive mission; and the **Tank Mk I (Female)** with larger sponsons and an armament of four Vickers and two Lewis machine-guns, and intended for the anti-infantry support of the Tank Mk I (Male). Other variants were the **Mk I Tank Tender** with mild steel boxes in place of the sponsons, and the **Mk I Wireless Tank** without sponsons but with a tall aerial mast.

Thus the Tank Mk 1 made history by being the first tank to be used in combat, but it was something of a fiasco as far as the action was concerned. What the type did achieve in the long term was to impress on the British military hierarchy the fact that the tank did have potential, more funds and facilities being thereafter diverted towards the 'Tank Corps' which was duly established in July 1917.

Specification
Tank Mk I (Male)
Crew: 8
Weight: 28 tons
Powerplant: one 105-hp (78.3-kW) Daimler petrol engine
Dimensions: length with tail 9.91 m (32 ft 6 in); length of hull 8.05 m (26 ft 5 in); width over sponsons 4.19 m (13 ft 9 in); height 2.45 m (8 ft 0½ in)
Performance: maximum speed 6 km/h (3.7 mph); range 38 km (24 miles)

UK

Medium Tank Mk A



A Medium Tank Mk A, the famous 'Whippet'. This vehicle was armed with two Hotchkiss machine-guns and had a rigid turret superstructure. Armour was 14-mm (0.55-in) thick at best.

When the first tanks were designed they were intended to be little more than 'machine-gun destroyers' capable of crossing rough country. As a result they were huge lumbering beasts that could cross trenches but could not move very fast over good ground. By 1916 the idea of using the tanks as a form of cavalry that could exploit any breakthroughs brought about by the heavy tanks began to take root. It was proposed that a new design of light tank with few obstacle-crossing attributes but capable of speed across good ground should be designed and built, and such a product was developed by Mr (later Sir) William Tritton, who had been instrumental in the development of the early 'landships'.

For the new design, soon nicknamed **Whippet**, Tritton reverted to his early 'Little Willie' layout in which flat rather than lozenge-shaped tracks were used. A front-mounted engine bay was slung between the tracks, and this housed two Tylor 45-hp (33.6-kW) London bus engines, one to drive each track; steering was effected by speeding or slowing each track. Towards the rear was the driver on the left, with the fighting compartment to his right. Originally this latter was to have been a turreted affair, but this was changed to a rigid superstructure mounting one Hotchkiss machine-gun in a special mounting on each face. Armour ranged in thickness from 5 mm (0.2 in) to 14 mm (0.55 in).

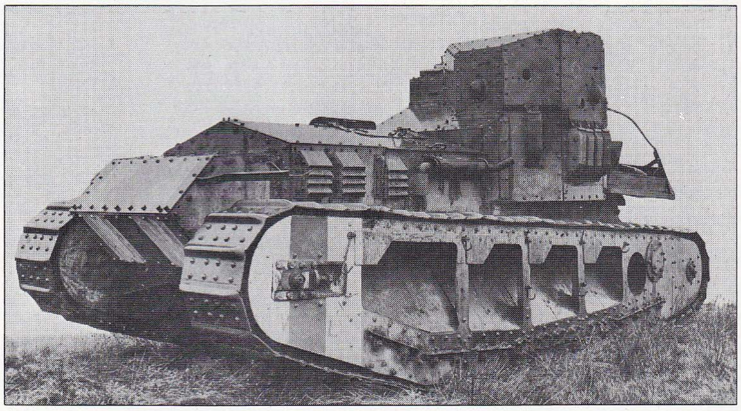
The prototype of the Whippet was ready by February 1917, and was ordered into production in the June of that year. But production took time and it was not until late 1917 that the first examples appeared. Even then they did not reach France quickly, and it was March 1918 before they saw action. The official name for the new tank was the **Medium Tank Mk A**, but to everyone it was the Whippet. The type proved to be difficult to drive as the driver had to juggle constantly with each engine clutch to control the machine, and in action many were lost when they went out of control. But the Whippet soon proved to be reliable enough, and once on good ground it could notch up speeds greater than that of horsed cavalry.

At first the Whippets were used to plug gaps in the line during the major German advances, but it was when the time came for counterattack that they came into their own. Some made deep forays behind the enemy lines creating havoc as they went. One, the famous 'Musical Box', spent nine hours cruising German rear areas and gunning down unsuspecting rear echelon troops before it was finally knocked out by a field gun.

By the time of the Armistice the Whippet or Mk A was well established, but it did not remain in service long after that date. A few saw service during the Irish 'Troubles' and a batch was sent off to Japan in 1920 to become the first Japanese tanks. The Japanese were not the only foreign operators, however, for before the Armistice the Germans had captured enough for them to take the Medium Mk A into their own service, though the numbers were not large.

Specification
Medium Tank A
Crew: 3 or 4
Weight: 14 tons
Powerplant: two 45-hp (33.6-kW) Tylor four-cylinder petrol engines
Dimensions: length 6.10 m (20 ft 0 in); width 2.62 m (8 ft 7 in); height 2.74 m (9 ft 0 in)
Performance: maximum speed 13.4 km/h (8.3 mph); range 257 km (160 miles)

Right: In this photograph of a Medium Tank Mk A the prominent recognition stripes at the front are red and white. Note the complex shape of the turret superstructure and the large mud chutes under the track tops, which reflect the muddy Western Front conditions.



Below: Whippet tanks of the 3rd Battalion Tank Corps move up into action near Maillet Mailly on 26 March 1918. This was the first action in which the Whippet tanks were used, and when they charged a force of 300 German infantry they took many prisoners and routed the remainder. They later took part in several skirmishes in the area.

British Tank Development

Written about since the days of Leonardo, the armoured 'land ship' did not come to fruition until the development of the internal combustion engine and the invention of the caterpillar track coincided with the needs of armies floundering in the mud of Flanders. Few could know that those early experimental vehicles would lead to the massive armoured forces of World War II and after.

The idea of the armoured 'landship' was quite well established in fiction before 1914, and proposals to construct such a machine had been made to nearly every major army in Europe, including the British War Office. None of these proposals was taken up for the simple reason that there seemed to be no requirement for such a machine, but after 1914 that changed. Some far-sighted soldiers and others realized that the conditions existing on the Western Front could only be overcome by the use of mobile armoured machines.

One of these early prophets was Colonel E.D. Swinton, who used his position of influence to interest government officials in the concept. Accordingly a War Office committee was set up to investigate some proposals, but its efforts came to nothing. Not deterred, the Royal Navy took a hand as its Royal Naval Air Service armoured car squadrons had at least had some experience of armoured warfare in 1914. From their experience came a number of proposals that involved the use of a 'big wheel' vehicle with massive wheels that could cross trenches. At this point Winston Churchill became more than interested and set up what was to become known as the Landship Committee to investigate ways of crossing the French battlefields.

The 'big wheel' machine was given the construction go-ahead, and the attention of the committee was drawn to another device known as the Pedrail which used a wide central track carrying any load or powerplant above it. This too was ordered for trials, and more machines of the caterpillar track form were ordered for experimental work. There were several of these such as the Killen-Strait tractor, a Bullock Creep Grip tractor and a peculiar purpose-built machine that embodied the wheels of a Daimler-Foster tractor and was known as the Tritton Trench-crossing Machine. None of these machines was deemed suitable for the task, the same verdict befalling the Pedrail, which proved to be far too cumbersome a vehicle to cross rough ground.

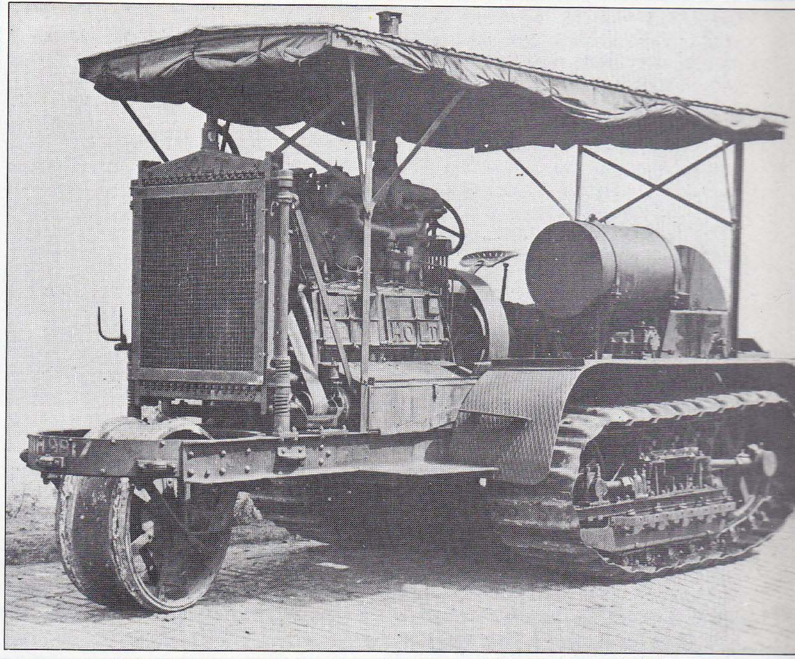
The Bullock tractor seemed to offer more promise, two such vehicles being specially obtained from the United States. Being primarily an agricultural machine, the Bullock could not be classed as intrinsically suitable, but its tracks did offer a way through mud and wire. Accordingly Mr William Tritton (later knighted for his services) of Foster's of Lincoln was asked to redesign the tractor. This man was the one who had been involved in the design of the Tritton Trench-crossing Machine after the 'big wheel' design had been abandoned.

Tritton accordingly used the Bullock track and suspension and built the 'No. 1 Lincoln Machine'. This design was far more promising, but the track was too narrow and gave constant trouble. A new track and some other improvements led to the vehicle later known as 'Little Willie' in December 1915.

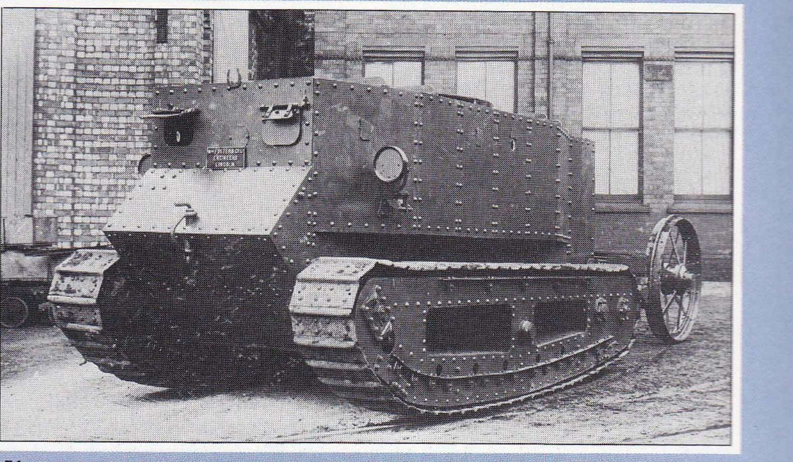
'Little Willie' was the first British tank, although at that time the term had not been coined. Although it appeared to meet the Landship Committee requirements, 'Little Willie' was still too unstable and had virtually no obstacle-crossing capabilities, so a Lieutenant Wilson, who had been working with Tritton at the behest of the Landship Committee, conceived the idea of greatly enlarging the tracks into an 'all-round' form that came to resemble the lozenge shape that epitomized the tanks of World War I. The box body of 'Little Willie' was accordingly altered to accommodate the new track outline and the machine became 'Mother'.

With 'Mother' the War Office once more became interested, and after demonstrations held in Hatfield Park in January 1916 the design was approved. The Landship Committee was then revised to become the Tank Supply Committee, for in an effort to hide the intended role of the new machine the codename 'water carrier' and eventually 'tank' was applied; the latter term was the one that stuck.

'Mother' was used as the prototype for the vehicles that later became the Tank Mk I. An order for 100 was placed in February 1916 and the tank had arrived.

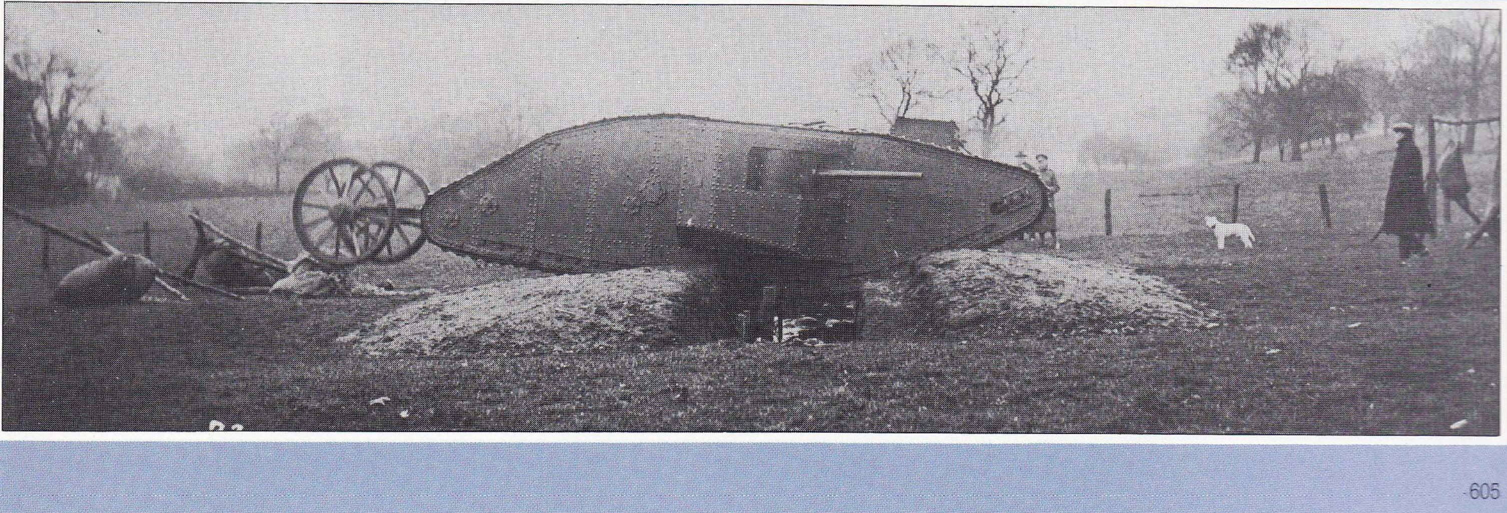


The American Holt tractor was obtained for use as a heavy artillery tractor but also served as the inspiration for the trials vehicles that led eventually to the tank. The tracks were very similar to those adopted for use on 'Little Willie'.



Above: 'Little Willie' in pristine form at the William Foster and Co works in Lincoln, complete with the original form of wheeled steering tail. This body form was later adapted with the large 'lozenge' tracks to form the basis of 'Mother', the first of the real combat tanks. 'Little Willie' is now in the Tank Museum at Bovington, Dorset.

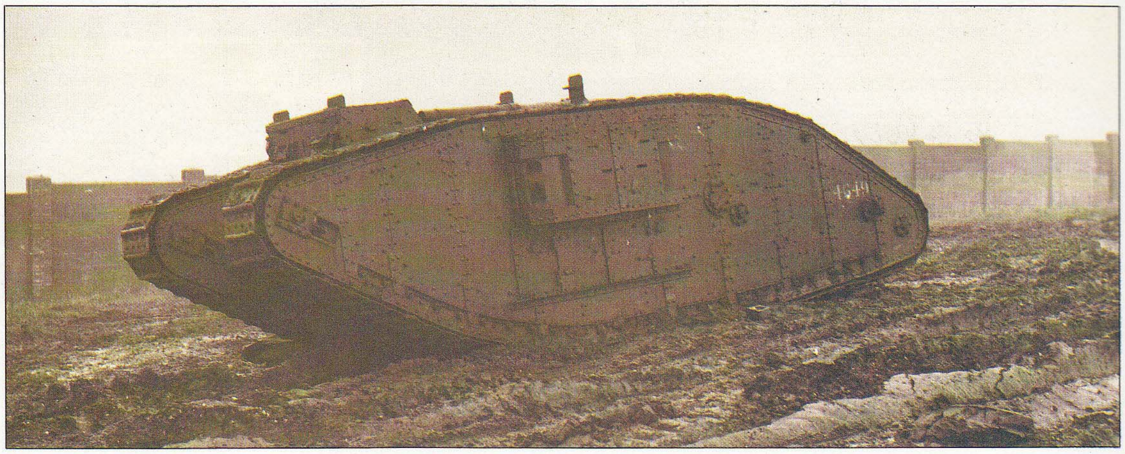
Below: 'Mother' shows her paces in Poppleton's Field, Lincoln, on 14 January 1916. Other such obstacles were later constructed in Hatfield Park for demonstrations in front of the Landship Committee and other VIPs. 'Mother' took them all in her stride, and the vehicle was ordered into large scale production.



UK

Tank Mk IV

The **Tank Mk IV** was the most numerous type used during World War I, and benefited from all the many design and tactical lessons that had been so desperately hard-won since the service debut of the Tank Mk I. Only relatively small numbers of the **Tank Mk II** and **Tank Mk III** had been built (50 of each), and most of these were converted to stores carriers and special-duties. The Mk II featured a wider track shoe at every sixth link, and the Mk III had better armour. When the Mk IV appeared in March 1917 it was the forerunner of a batch of 1,000 that had been ordered in the previous year, the design originating in October 1916.



The Mk IV had several changes over the previous three marks, which differed only in small detail. The main change operationally was the introduction of better armour (ranging in thickness from 6 mm/0.24 to 12 mm/0.47 in), first used on the Mk III, which had to be introduced as the Germans had quickly developed special anti-tank rifles and armour-piercing ammunition. Another change was to armament. The ex-naval 6-pdr (57-mm) guns of earlier marks were 40 calibres long, and were frequently bent or embedded into the ground when trench-crossing. They were replaced in the Mk IV by much shorter guns only 23 calibres long, and these thereafter remained the standard tank guns for many years. Secondary armament was four Lewis machine-guns. The sponsons for the guns were also made smaller and for transport they could be pushed into the vehicle on rails, whereas on the early marks the sponsons had to be removed altogether for transport. Numerous internal mechanical changes were introduced and an 'unditching' beam was placed ready for use above the hull.

The Mk IV carried over an armament concept that was introduced originally on the Mk I. This was the concept that certain tanks carried four primary machine-guns (two in each sponson) and two secondary guns, the 6-pdr (57-mm) guns being omitted. These were used for direct infantry support and trench-clearing, the variant being known as the **Tank Mk IV (Female)** in differentiation from the gun-armed **Tank Mk IV (Male).** There was also a variant with machine-guns in one sponson and a 6-pdr (57-mm) gun in the other and known as the **Tank Mk IV (Hermaphrodrite).**

It was the Mk IV that was used to such good effect at Cambrai and many of the tank battles thereafter, and after 1918 the Mk IV was retained by the Tank Corps for many years. Some were used in the Palestine battles and after the war they were used during the internal 'Troubles' in Ireland. A few were handed over to the Italians but perhaps the greatest users after the British were the Germans; almost inevitably many Mk IVs fell into the hands of the Germans, who then used them against the British, naming the type the **Beutepanzerwagen IV** (captured armoured vehicle). Like the British, the Germans used more Mk IVs than any other armoured vehicle. Other Mk IV variants were the **Mk IV Supply Tank**, the **Mk IV Tadpole Tank**, with length increased by 2.74 m (9 ft) at the rear for better trench-crossing, and the **Mk IV Fascine Tank**, fitted to carry trench-filling fascines (chain-bound wood bundles some 1.37 m/4 ft 6 in in diameter). There was also a crane version for salvage duties.

A Tank Mk IV (Female). The early tanks used water-cooled Vickers machine-guns, but these were soon replaced by air-cooled Hotchkiss machine-guns. Some Mk IVs, known as Hermaphrodites, were Female on one side and Male on the other with a 6-pdr gun to provide a more balanced weapon arrangement.

Specification
Tank Mk IV (Male)
Crew: 8
Weight: 28 tons
Powerplant: one 105- or 125-hp (78.3- or 93.2-kW) Daimler petrol engine
Dimensions: length 8.05 m (26 ft 5 in); width over sponsons 3.91 m (12 ft 7 in); height 2.49 m (8 ft 2 in)
Performance: maximum speed 6 km/h (3.7 mph); range 56 km (35 miles)

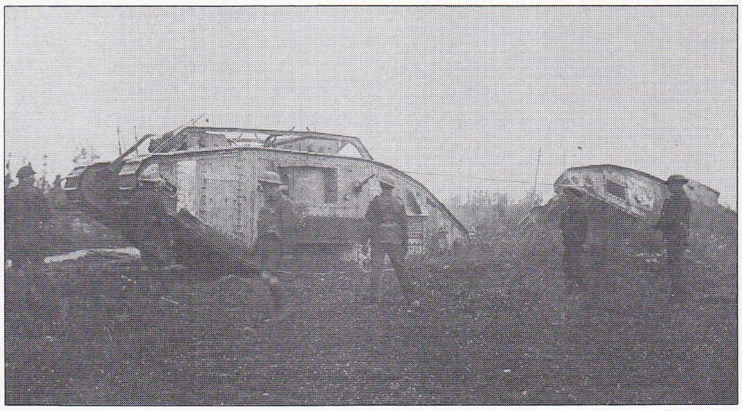
UK

Tank Mk V

The **Tank Mk V** was the last of the classic lozenge-shaped tanks to serve in any numbers, and embodied all the improvements introduced on the Mk IV together with the Wilson epicyclic gearbox that enabled the tank to be driven by one man, the earlier marks depending on the actions of two men and a great deal of team-work for steering. The Mk V also had a purpose-built engine, the 150-hp (112-kW) Ricardo, which not only gave more power but made life for the engineers inside the confines of the hull a great deal easier. Another innovation was the introduction of a cupola for the commander and at long last provision was made for communication with the outside world by the mounting of semaphore arms on the back of the hull. Until then a tank crew was virtually isolated from other troops not only by the great noise produced by the engine but by poor vision devices and no method of passing messages in or out. The early tanks could communicate only by sending pigeons to the rear if required. Main armament of the male version was two 6-pdr (57-mm) guns, supplemented by four Hotchkiss machine-guns, and the armour varied in thickness from 6 mm (0.24 in) to 14 mm (0.55 in).

About 400 Mk Vs had been built in Birmingham by the time of the Armistice, but even by then the mark had begun to sprout variants. The first introduced was a new 1.83-m (6-ft) section into the hull to improve trench-crossing capabilities and also to provide more internal space for personnel (up to 25 troops) or stores. This was the **Tank Mk V***, which was converted in the field, while the comparable but much improved **Tank Mk V**** was introduced on the production lines. As with the Mk IV, this improved vehicle was produced in **Tank Mk V (Male)** and **Tank Mk VI (Female)** forms.

The Mk V was also the first American tank. Enough Mk Vs were passed to the newly-arrived US Army partially to equip a battalion together with some French FT 17s.



Post-war the Mk V was used as the standard equipment of the Tank Corps, and although there were several designs based on the Mk V, none was produced or used in any numbers. The Mk V was used for all manner of experiments that ranged from bridge-laying to mine-clearing with variations of the **Tank Mk V** (Tank RE)**, but never in any great numbers for the years after 1918 were not financially conducive to such innovations. Numbers of Mk Vs were passed to armies such as that of Canada, where they remained in use until the early 1930s.

The Mk V never had the chance to replace the earlier Mk IV, although it arrived on the Western Front from about mid-1918 onwards. It proved to be far more reliable and easy to use than the earlier marks, but the war ended before it could take part in the massive armoured operations that had been planned for 1919. Those plans called for the massed use of Mk Vs along with some special tanks that never left the drawing board (supply tanks, armoured recovery vehicles etc.) along chosen sectors of front. They were to be used in a manner in which the infantry was to have little part to play as the tanks alone would sweep all before them and achieve the big 'breakthrough' that had been sought for so desperately and expensively since 1914. But the Armistice thankfully put paid to 'Plan 1919' and the world had to wait until 1939 and 1940 for the envisaged *Blitzkrieg*.

Using a cable, a Tank Mk V (Male) assists another tank out of difficulties in August 1918. The Mk V carries red-white-red recognition stripes at the front. The rails over the top are for unditching beams.

Specification
Tank Mk V (Male)
Crew: 8
Weight: 29 tons
Powerplant: one 150-hp (112-kW) Ricardo petrol engine
Dimensions: length 8.05 m (26 ft 5 in); width over sponsons 4.11 m (13 ft 6 in); height 2.64 m (8 ft 8 in)
Performance: maximum speed 7.4 km/h (4.6 mph); range 72 km (45 miles)

The Mk IV and Mk V in Action

First introduced in June 1917, the British Mk IV and its Mk V successor were to become the workhorses of Allied tank operations, being used in large numbers during the offensives of 1918.

When the first Mk I tanks were ordered into action along the Somme in the autumn of 1916 they were unprepared as regards training and as to the mechanical efficiency of their machines. As if this were not enough, the tanks were called upon to perform miracles. They were dispersed in ones and twos along the front but were still expected to provide the magic punch that would break the German lines. To do this they were asked to make their way across shell-torn ground which was so wet that it swallowed artillery trains without trace, and to top it all in some places the tanks were expected to cross swollen rivers and streams. The tank officers pleaded in vain for some sort of sense to be instilled in their orders, but the military mind of the day was such that attrition had become the standard tactic, and the tanks were just another handy weapon for this system.

The Somme offensive shuddered to a bloody halt in the last days of 1916. A great opportunity to use the tank to good effect had been wasted along the Somme, and already the Germans were studying the few tanks captured along the Somme and developing a special armour-piercing bullet to penetrate the armour. By the time the Mk I and the few new Mk IIs went into action again at Bullecourt in the snow of 11 April 1917, these new armour-piercing rounds were in use, proving effective to the extent that some tanks were lost. Thereafter each German soldier carried at least five rounds of the new 'K' ammunition and machine-gunners got much more.

The arrival of this new ammunition was duly noted by the British, who already had some ideas for future tank improvements as a result of the dearly-won lessons of 1916. One lesson was that the method of securing the armour onto the tank hull would have to be revised. Even conventional bullets fired against the armour found their way into the interior in the form of lead 'splash' that could cause some nasty wounds for the crew. When combined with the thicker armour that was proof against the German 'K' rounds, the construction of the new Mk IV promised far better protection; and coupled with the improved interior ventilation life for the tank crews looked far more promising, experience gained during the first Mk IV battle seeming to bear this out.

The Mk IVs went into action at Messines on 7 June 1917. Messines was one of those massive set-piece battles favoured by the British in view of the masses of semi-trained infantry provided by a citizen's army which proved to be inflexible in military skills. The battle started with the usual preliminary artillery bombardment, which was followed by a relative novelty, a series of large mines under the German lines being detonated all at the same instant. The tanks were to be used in their usual role: accompaniment for the infantry to knock out machine-gun nests.

Some 76 of the new Mk IVs were to be used, of which 72 were in the immediate front line ready for the off the night before. In nearly all the tank battles the tanks were placed on their starting lines the previous night. This involved a great deal of preparation and many difficulties, for the tank crews had poor vision at the best of times and in the dark things were much worse. The noise of the engines prevented voice communications, so there was usually no other recourse but to lay down, well in advance, markers such as white tapes or posts to guide the way. The tank crews had to rely on these or guides who walked in front, but all too often the guides never turned up or the tapes were knocked down by artillery fire. Thus the crews had to navigate using large-scale maps, a special tank compass and their intuition. After a while the tank crews grew to be very good at finding their own way in the dark, to the extent that the infantry grew to rely on their guidance rather than the other way round. But it was a slow and tiring business that often took all night, and the crews were exhausted before the battle even began.

Messines was no different. Once the mines went up the tanks lumbered forward along with the infantry waves. The front lines were taken from the German infantry, who were dazed by the blast and shock of the mines, and the tanks lumbered on to the next objective. One Mk IV earned itself a great deal of praise by knocking out machine-gun posts in the village of Wytschaeta (White Sheet to the British) and making things easy for the infantry. Some tanks then got stuck in the mud that prevailed across the battlefield, but were able to act as static pillboxes and provide supporting machine-gun fire.

First blood

The battle then petered to the usual halt, for the tanks had been assigned secondary objectives in a battle that overall had only limited objectives. They had generally proved themselves effective and the new armour of the Mk IVs proved to be able to stand up to the German 'K' armour-piercing ammunition.

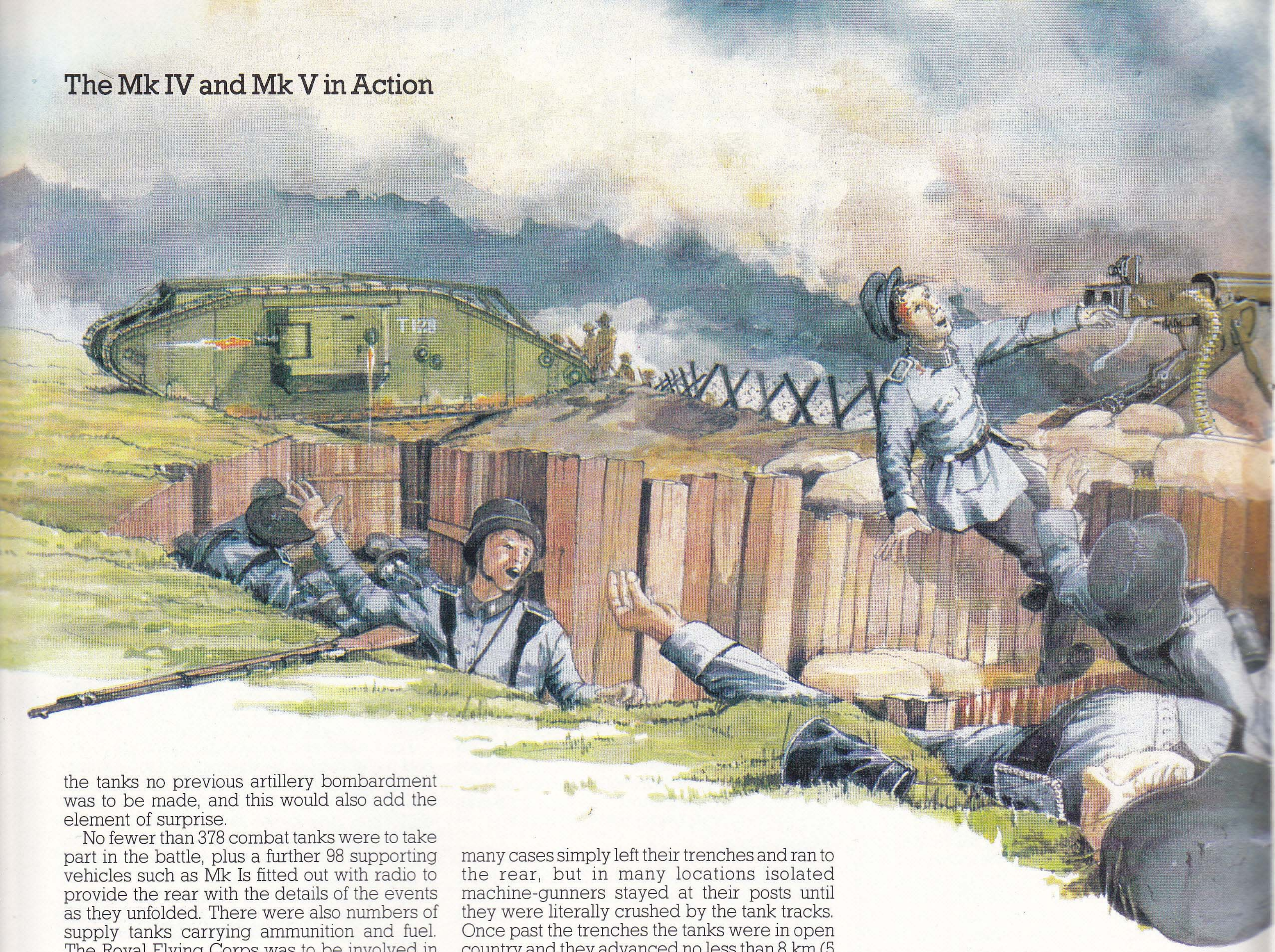
Thereafter the Mk IVs were called upon to provide support in two more minor affairs before they were duly given their big chance. For some time the tank staff officers had been harrying the general staff to allow them to wage a battle on terms that would suit the tanks, over ground that had not been churned up by repeated artillery bombardments, and with the tanks massed in numbers that would overwhelm the opposition. At last the tanks were given their chance and they then fought the epic battle that history has dignified as the 1st Battle of Cambrai, on 20 November 1917.

A Tank Mk IV in use by the Germans – note the circular flame-thrower pack in the foreground. To the Germans such tanks were known as 'beute Panzer', and the Germans used more of them in action than their own A7V. This appears to be a Mk IV Male.

For a number of reasons the Cambrai sector had not attracted the attentions of the artillery as had some other sectors. The general lie of the country is flat and open, but it was made difficult in 1917 by no less than three lines of deep trenches. The tanks would have to cross these, and the tank crews accordingly devised a drill whereby three tanks worked in teams and used bundles of timber known as fascines to cross the trenches. Each tank in turn would drop its fascine into a trench and the others would then cross. To make the going easier for

A Tank Mk V and triumphant New Zealand infantry soon after the capture of Grevillers on 25 August 1918. Some troops are hitching a lift on the tank, which belonged to the 10th Battalion Tank Corps and appears to be moving up into action again.

The Mk IV and Mk V in Action



the tanks no previous artillery bombardment was to be made, and this would also add the element of surprise.

No fewer than 378 combat tanks were to take part in the battle, plus a further 98 supporting vehicles such as Mk Is fitted out with radio to provide the rear with the details of the events as they unfolded. There were also numbers of supply tanks carrying ammunition and fuel. The Royal Flying Corps was to be involved in scouting and the subsequent artillery observation.

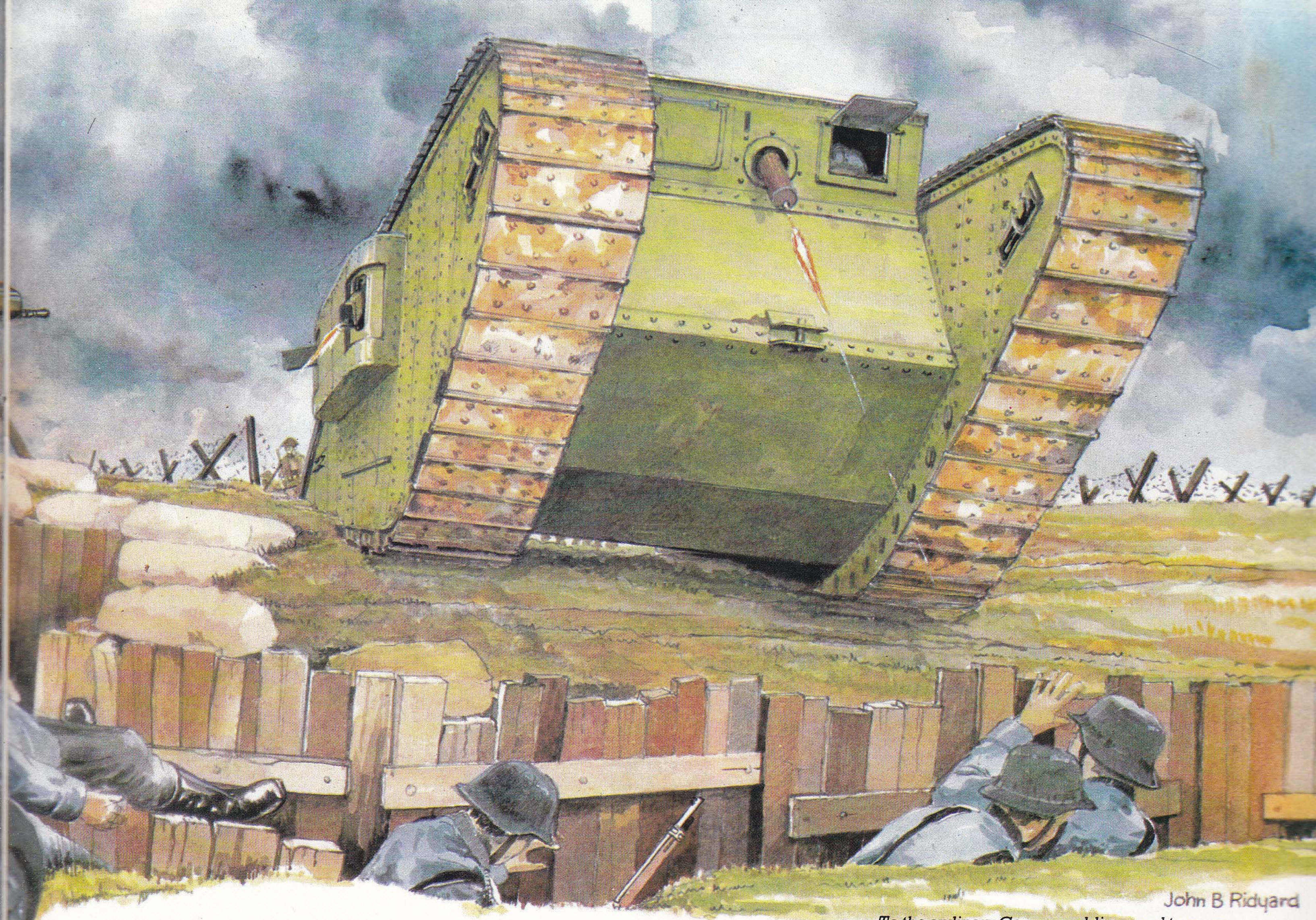
Everything was ready on the morning of 20 November, and at 06.00 the battle started. The tanks were led into action by their commander, General Hugh Elles, and they soon advanced into the mist and crossed the front trenches. The drills and practice then paid off, for not only did they cross the first trenches but the second and third line as well. The effect of the tanks appearing out of the mist was too much for many of the hapless German infantry, who in many cases simply left their trenches and ran to the rear, but in many locations isolated machine-gunners stayed at their posts until they were literally crushed by the tank tracks. Once past the trenches the tanks were in open country and they advanced no less than 8 km (5 miles) at one point, far more than the advances of all the Somme battles in five months during the year before.

The tanks did not have it all their own way, for at one point a single German field gun was able to knock out several tanks. Others came to grief in deep ditches, and others again were knocked out as they tried to charge directly against German batteries. But in general all the objectives were reached and the wire was cleared for the promised cavalry to storm through.

The cavalry did not arrive, and in the resultant and expected German counterattacks all the ground that had been gained was lost. The main cause of this failure was later traced to the higher staff levels where the promised success of the Tank Corps was treated with a great deal of scepticism: they did not expect the tanks to be successful, and thus the reserves available were too far away from the scene of the action to be of any use in holding the gains won by the tanks. The tanks could not hold the ground alone, and had to be withdrawn to regroup and replenish their supplies; the infantry who had advanced with them were too few in number to hold the large areas taken. Thus Cambrai ended with no tangible gains in terms of territory, but the tanks had proved their point. Provided they were able to operate on terms that suited them and in sufficient numbers they could carry the day and the battle. Their point had been made and thereafter the higher echelons should have heeded that point.

But that lesson was not immediately learned. The next major action in which the tanks played a part was once again on the Somme, in a battle that was being planned even before

This photograph purports to show American Mk Vs attacking German trenches during October 1918, but it has that undefinable air of a 'posed' shot; pictures of tanks actually in action are rare. The Americans used the Mk V along with some French Renault FT 17 light tanks in their first armoured units.



To the ordinary German soldier, used to mass infantry attacks, the slow, ponderous approach of seemingly invulnerable tanks had a terrifying effect.

Cambrai. Once again the tanks were dispersed in small numbers along a wide front, so although they were able to provide local support and knock out local strongpoints, they could not prevail. This time the battle had been planned by the Germans, and was the first in the series of breakthrough battles that started on 21 March 1918. The Germans broke through in many places and as they advanced the few tanks available locally provided support for the retreating British units. Many tanks were lost during this period, more from lack of fuel than any operational reason, and eventually the German advances ground to a halt, but not before they had thoroughly rattled the Allied commanders.

Allied strength increases

Although it was not apparent at that time, the March battles were the last major efforts the Germans could produce. Worn down by years of economic blockade and lack of essential supplies, the German army was growing short of men and munitions. For the Allies things were at last going the other way. The Americans were arriving in appreciable numbers and were instrumental in halting the German advance at Château-Thierry. And to add to future prospects the first of the new Mk Vs arrived in France ready to go into action in July. The number of tanks and trained crews was also increasing in leaps and bounds, and by mid-1918 no fewer than 15 complete battalions were ready for use.

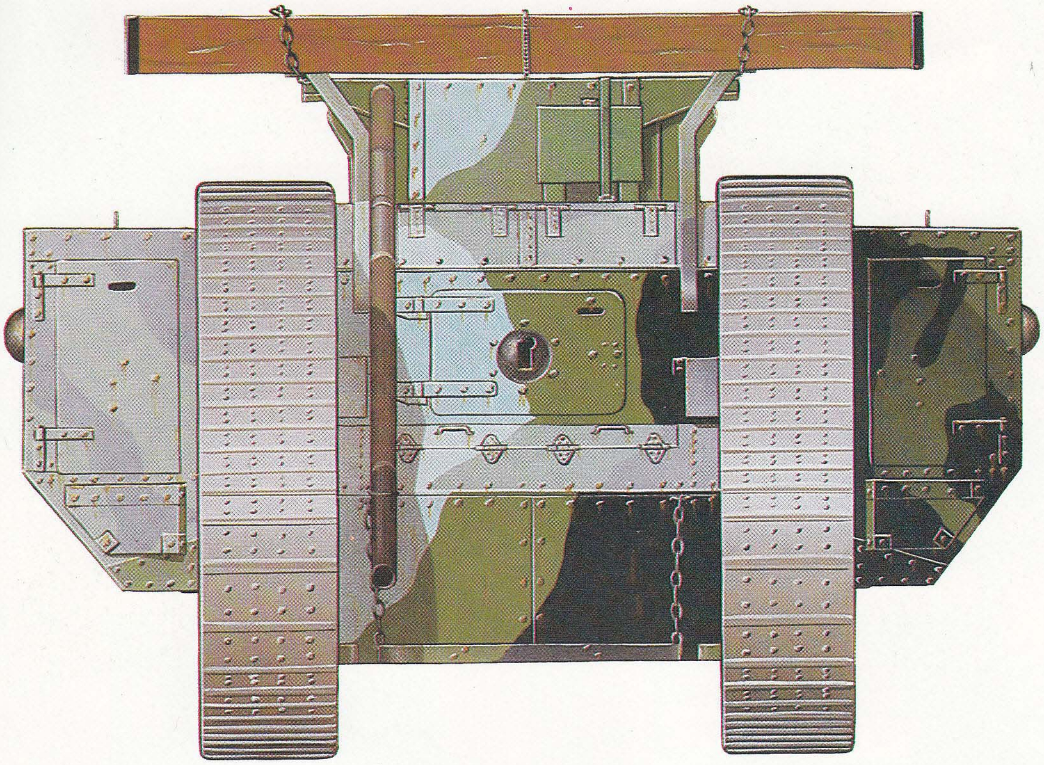
In the series of battles that culminated in the Armistice one small example stands out as a text-book specimen of inter-arm co-operation and planning. This was the action at Hamel on 4 July 1918, when for the first time Australian infantry worked with the tanks. In this limited-objective action aircraft flew over the front as the tanks assembled and a brief but effective artillery barrage presaged the attack. The tanks then advanced, supporting their Australian partners right up to the planned objective. Once this had been reached, supply tanks came forward with enough supplies to ensure that the troops could hold the ground; and the tanks remained around long enough to knock out any machine-guns that had escaped their previous attentions. The result was an action in which there were, for the Western Front, very small casualties; the five tanks knocked out were all later recovered.

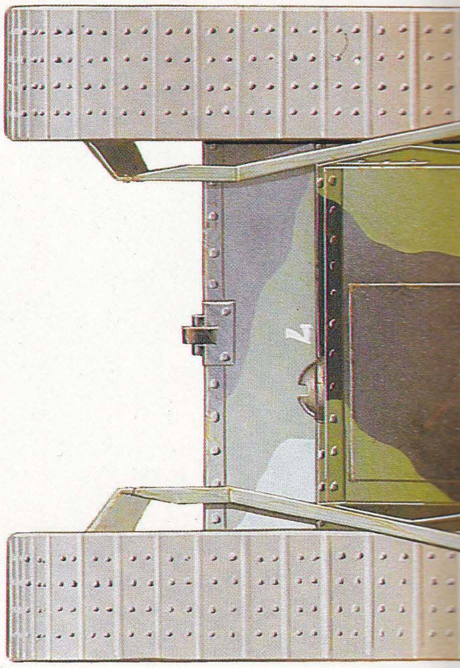
The largest of all the tank battles was the Battle of Amiens which started on 8 August 1918. The number of tanks involved was no fewer than 450, but some of these were held as reserves and to back up this main strength there were a further 118 supply tanks. The tanks were organized in 12 battalions, eight of them equipped with the Mk V, two with the Mk V* and two with the Medium Mk A Whippet.

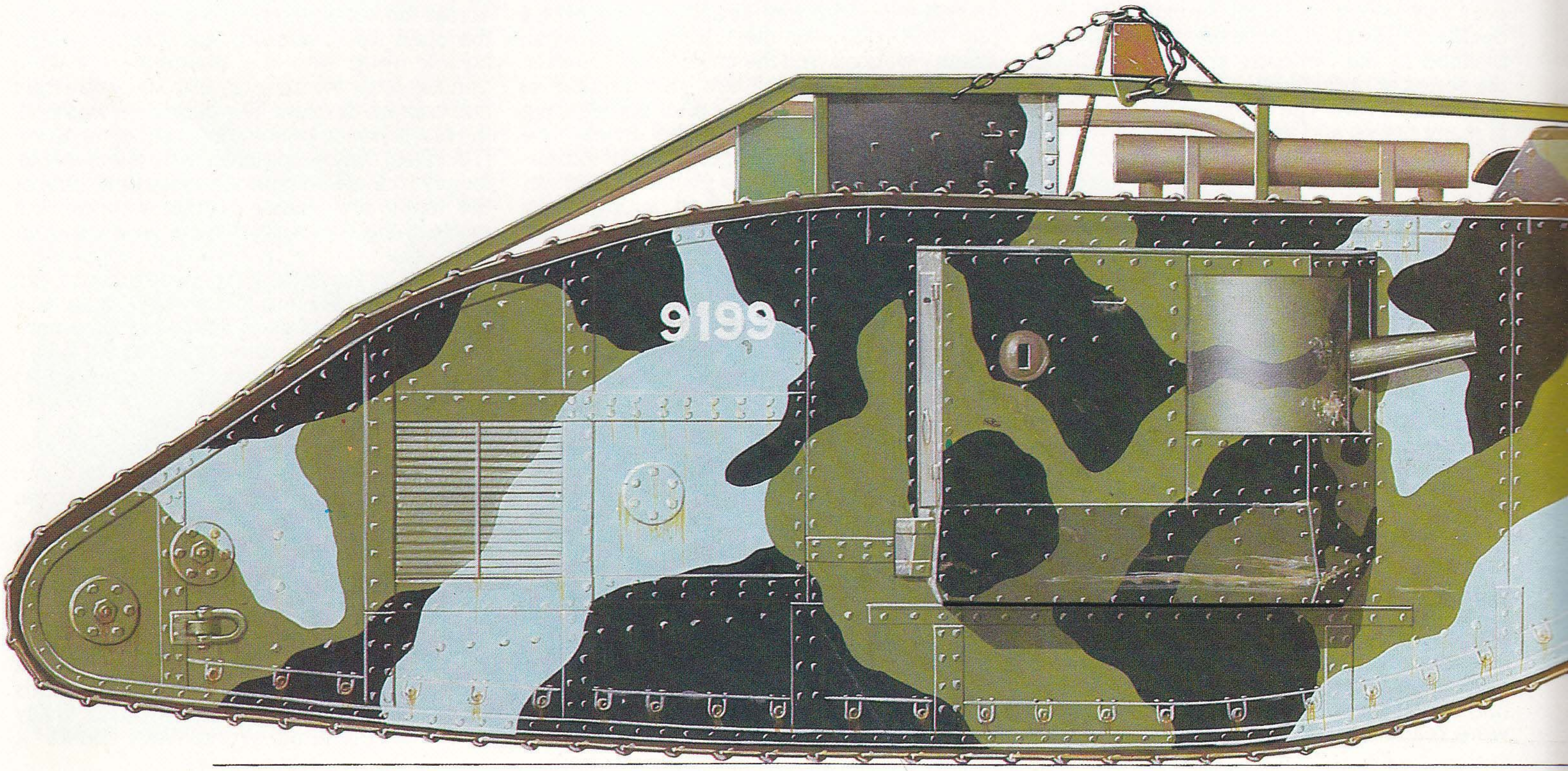
At Amiens there were no half measures. As the tanks assembled their noise was masked by low-flying aircraft and artillery, and in the morning light the tanks moved forward along the British 4th Army's front. The breakthrough was soon made, and the German lines crumbled. As the tanks advanced they were joined by an armoured car battalion that was helped across the battlefield by the tanks, and once in the open the armoured cars spread out and struck deep into the German rear. One armoured car even managed to shoot up a train and capture its crew. The disruption was total, the first advance penetrating as deep as 12 km (7½ miles). Numerous tanks were knocked out, mainly by the field guns that were emerging as the tanks' only major counter-weapon, but many of these casualties were recovered for later use.

This time the cavalry did move forward, but once past the lines soon proved incapable of advancing against even single machine-guns and of moving at the same speed as the Whippets. If proof was needed that the cavalry was no longer viable in modern warfare, the Battle of Amiens provided that proof.

The advances were held and the next blow was prepared. This fell during a series of actions at Bapaume, Arras, Epéhy, Cambrai (again), Catelet-Bony and Selle. These battles usually involved the tanks advancing in close co-operation with the infantry as the artillery supplied support and aircraft scouted above. The degree of co-operation was total, to an extent that was not relearned until well after 1940, and the results rolled up the German lines and sent the Germans gradually back towards Germany. The Armistice was declared finally on 11 November and World War I ended.



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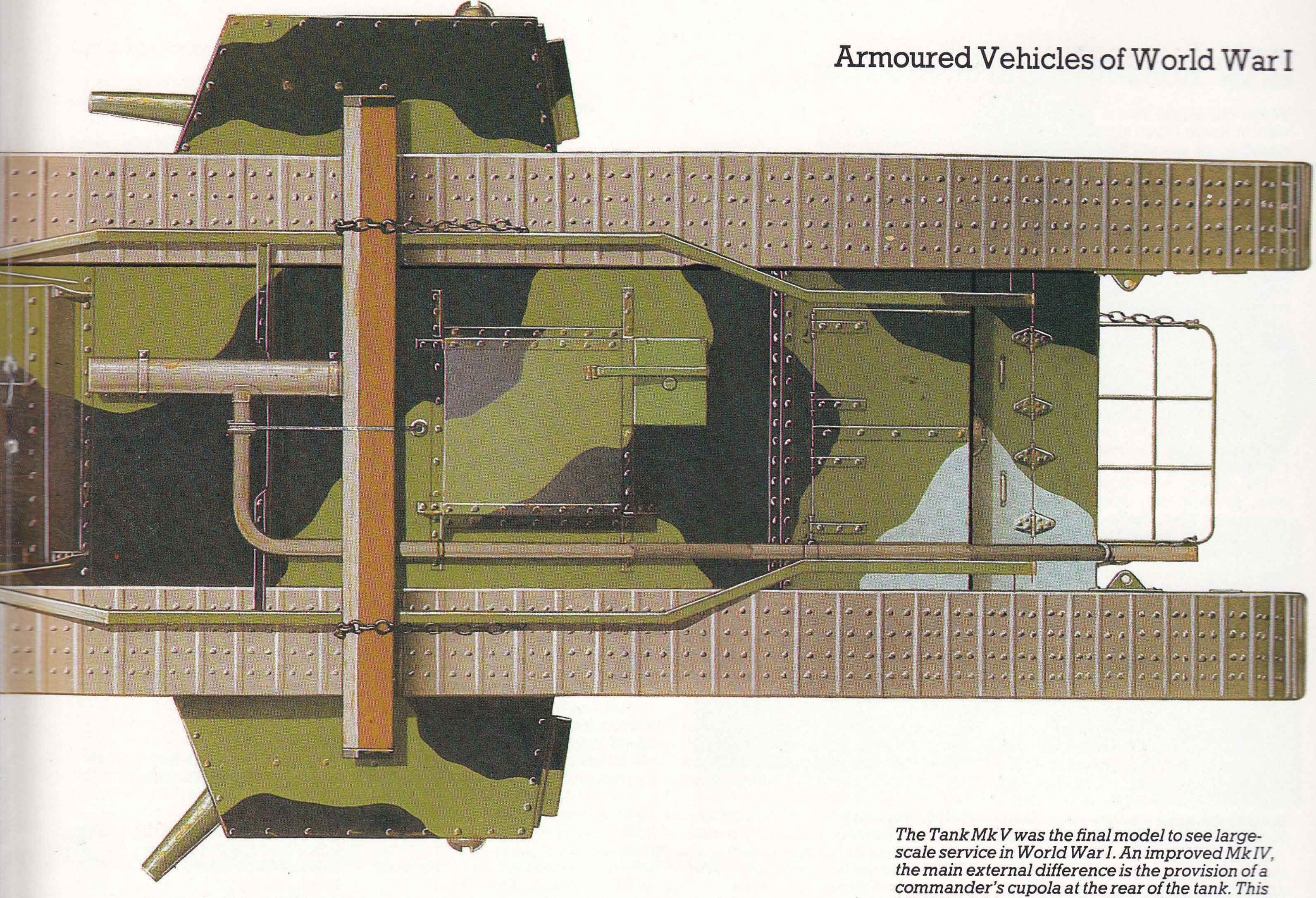
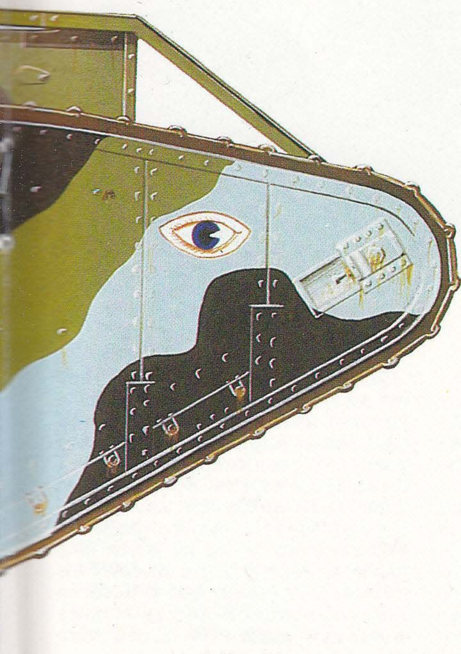
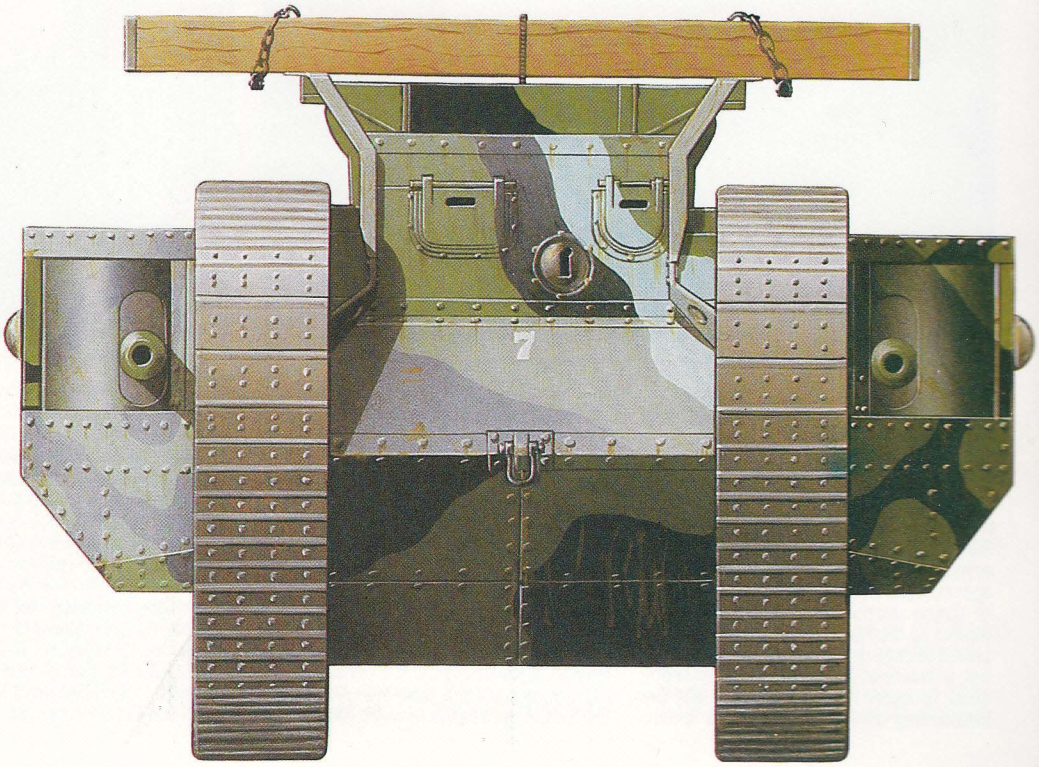


The Tank Mk V was the final model to see large-scale service in World War I. An improved Mk IV, the main external difference is the provision of a commander's cupola at the rear of the tank. This Mk V (Male) is equipped with unditching gear, the large beam resting on rails until needed, when it is attached firmly to the tracks. It then provides the extra traction required to get out of a ditch.





THE ART WORKSHOP

UK

Rolls-Royce armoured car

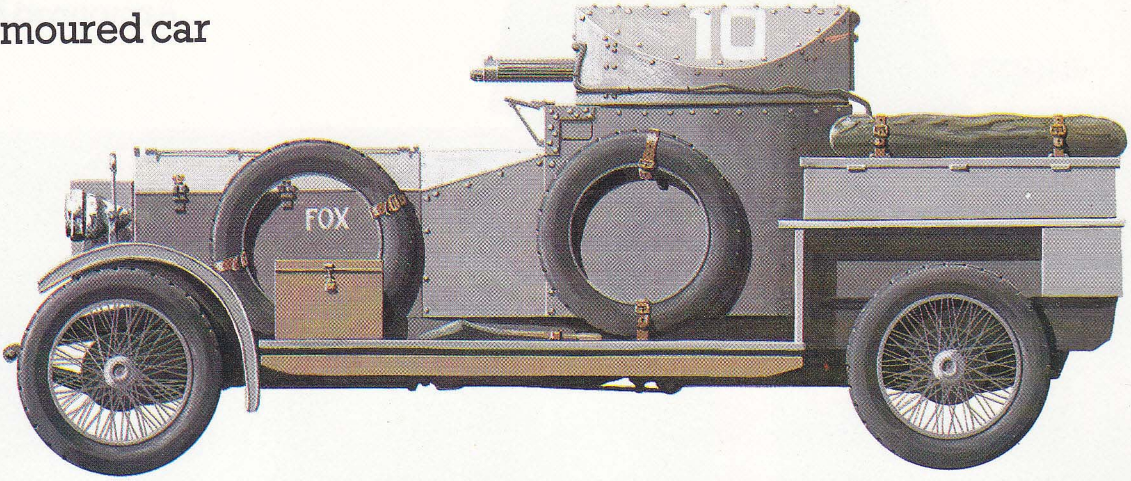
When the Royal Naval Air Service went to war in 1914 it sent a variegated squadron of aircraft and vehicles to France and Belgium. Once there, some of the naval officers noted the way in which the Belgians were using armoured cars to harry the advancing Germans and to carry out raiding and other missions, and decided to join in. Within a few days some of the **Rolls-Royce Silver Ghost** touring cars used by the RNAS were converted in Dunkirk to carry armour plating on the sides. A single machine-gun was carried behind the driver. The Admiralty noted the success of the conversion and gave its sanction to the design of proper armoured cars based on the Silver Ghost chassis, and the first of these official designs was in France by the end of 1914.

The official Rolls-Royce armoured car, sometimes known as the **Armoured Car, Rolls-Royce (1914 Admiralty Turreted Pattern)**, was a straightforward conversion of the civilian Silver Ghost tourer with a turret and armour added. The springs were strengthened to take the extra weight but that was all the modification required on the chassis. The armour extended all around the chassis, and the turret, which mounted a Vickers or Maxim machine-gun, had peculiar sloping sides rather like the shape of a bishop's mitre. The radiator had an armoured door and the roof armour on the turret could be removed if required. A small area behind the turret was left open to carry stores and a ground-mounted machine-gun. Once in service the Rolls-Royce armoured cars proved very successful, remaining in service until 1922. Maximum armour thickness was 9 mm (0.35 in).

By March 1915 the first RNAS armoured car squadrons were in being in France, most of them equipped with the Rolls-Royce. Before that the RNAS armoured cars carried out some patrols and reconnaissance work along the French and Belgian coastal areas until the 'Race to the Sea' reached the Channel Coast and trench warfare became the norm. Once that was in progress there was little enough for the Rolls-Royces to do and as more squadrons were established they were used for anti-invasion patrols along the east coast of England. When the first formal armoured car squadrons were sent to France they had little to do, so eventually these RNAS armoured car squadrons were disbanded, the car being handed over to a generally uninterested British army.

Rolls-Royce armoured cars were thereafter used on other fronts and in the overseas theatres of war such as the North West Frontier in India, at Gallipoli (where they could accomplish nothing), German South West Africa (where they accomplished much during a campaign about which little is known) and in Uganda. It was in the Western Desert and the Arabian peninsula that the Rolls-Royce armoured cars and a number of similar armoured tenders (like the armoured car but without the turret and used for carrying stores or personnel) made their greatest impact. There they proved to be remarkably reliable, fast and capable of crossing some very rough country.

The Rolls-Royce armoured cars soldiered on until 1922 when they began to be replaced by a modernized version, the **Armoured Car, Rolls-Royce (1920 Pattern).** Even so, some of the old Pattern 1914 cars lasted until well into World War II in India.



This 1914 Rolls-Royce armoured car has the original Admiralty pattern turret, mounting a Vickers 7.7 mm (0.303 in) machine-gun. These cars provided sterling service throughout the war and many remained in use for years afterwards, especially in India and the African colonies.

Specification

Armoured Car, Rolls-Royce (1914 Admiralty Turreted Pattern)

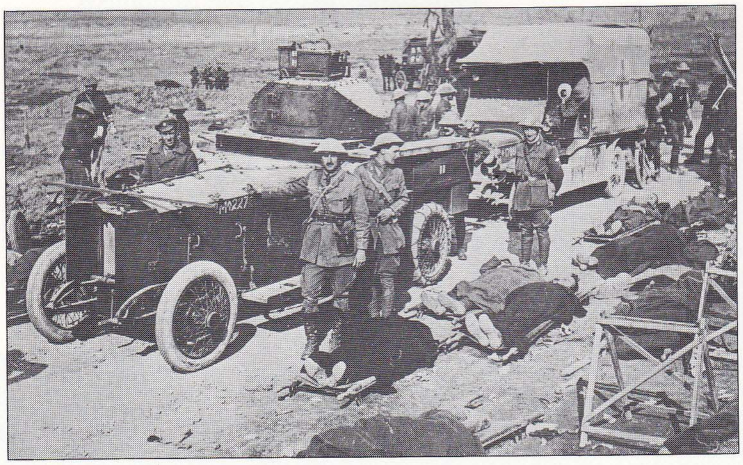
Crew: 3 or 4

Weight: 3.5 tons

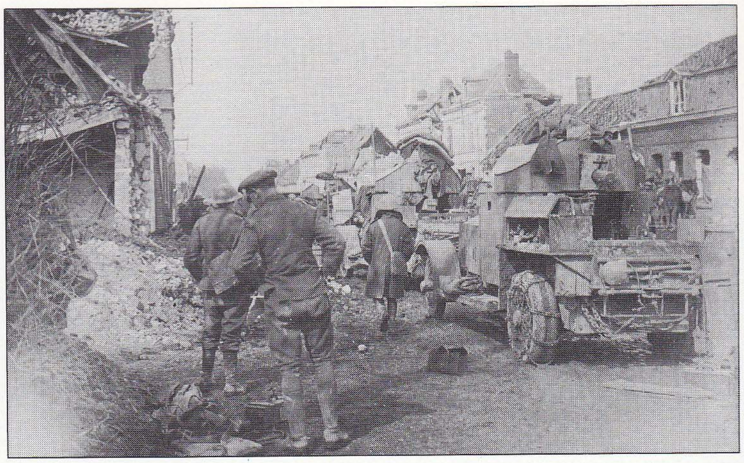
Powerplant: 40/50-hp (30/37.3-kW) Rolls-Royce petrol engine

Dimensions: length 5.03 m (16 ft 6 in); width 1.91 m (6 ft 3 in); height 2.55 m (8 ft 4½ in)

Performance: maximum speed 95 km/h (60 mph); range 240 km (150 miles)



A Rolls-Royce armoured car and its crew are shown at a Guards Division casualty evacuation point near Guillemont during September 1916; the Somme Offensive was at its height. Note the anti-mud chains around the tyres of the rear wheels and the lack of front mudguards.



Street scene in Arras, April 1917, with Rolls-Royce armoured cars and their crews awaiting a move. All the cars are well loaded with the crews' gear and equipment, and the ever-present muddy conditions have dictated the use of tyre chains on the rear drive wheels.

UK

Lanchester armoured car

After the Rolls-Royce armoured car, the **Armoured Car, Lanchester (Admiralty Turreted Pattern)** was the most numerous in service with the Royal Naval Air Service (RNAS) armoured car squadrons that had sprung up by the end of 1914. Originally these armoured cars were supposed to provide support for the air bases and to retrieve downed airmen, but it was not long before they were used in more offensive roles. By the beginning of 1915 they were being organized into formal armoured car squadrons as part of a larger Royal Naval Armoured Car Divisions.

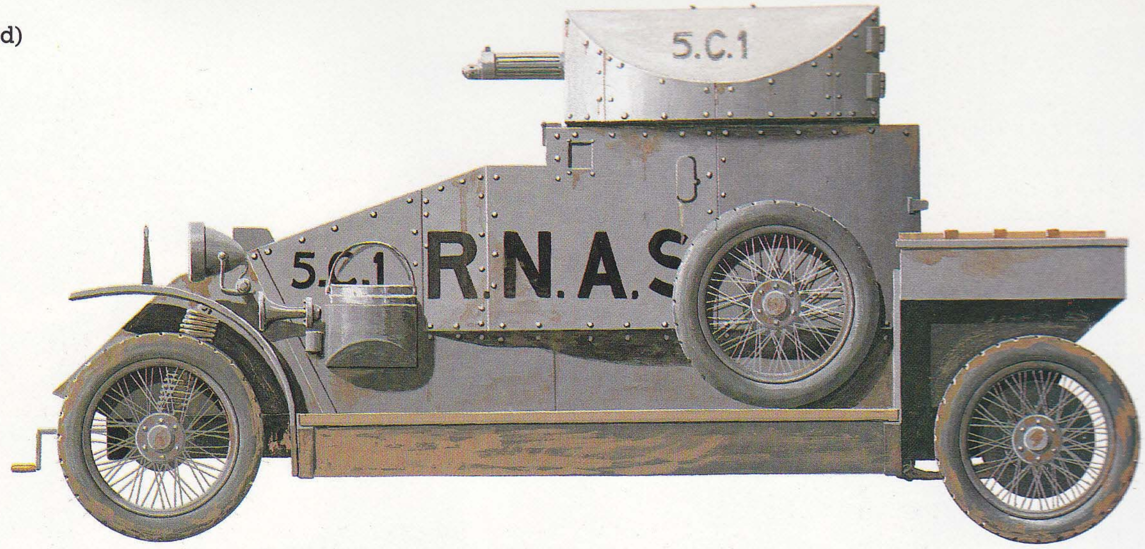
In appearance the Lanchester armoured car was very similar in layout to the Rolls-Royce and also had a turret with sloping sides. However, the Lanchester had sloping armour over the front of the bonnet in place of the more angular bonnet of the Rolls-Royce. It was originally a civilian touring car but by the time the Admiralty designers had been at work little of the original bodywork remained. However, the engine was retained for not only did it provide a useful 60 hp (44.7 kW) but it had many advanced design features for its day, along with a very advanced epicyclic gearbox.

When the Royal Navy armoured cars were handed over to the army in August 1915 the latter decided that the collection of designs it received was too varied for logistic and operational comfort. It thus decided to standardize the Rolls-Royce design, and the Lanchesters were put to one side. They did not remain neglected for long for in October 1915 they were gathered together in England. The following year they were organized as No. 1 Squadron of the Royal Naval Armoured Car Division and sent to Russia. Once there they took part in no end of campaigns about which little has been recorded. For much of the time the Lanchesters had to travel on their own wheels across country where few roads existed, and were used in Persia, Romania and Galicia, operating in climates that varied from desert heat to near-Arctic conditions. But they kept going. For much of their operational life the Lanchesters were used in a manner that anticipated what was later to become the norm in armoured warfare. They acted as the spearhead of large motorized columns carrying troops on armoured lorries and personnel trucks that ranged far and wide over the wastes of southern Russia and the Iraq deserts. They acted as scouts, fire-support vehicles and general raiders, roles in which the Lanchesters proved reliable and fast.

The Lanchester remained with the Russians until the final failure of the Brusilov Offensive in mid-1917. Thereafter Russian sank into the throes of internal disruption and revolution, and there was no part the Lanchester squadron could play in such internal conflicts. Thus they were shipped back to the United Kingdom with well over 53,000 miles added to their speedometer clocks.

Specification

Armoured Car, Lanchester (Admiralty Turreted Pattern)
Crew: 4
Weight: 4.8 tons
Powerplant: one 60-hp (45-kW) Lanchester petrol engine
Dimensions: length 4.88 m (16 ft 0 in); width 1.93 m (6 ft 4 in); height 2.286 m (7 ft 6 in)
Performance: maximum speed 80 km/h (50 mph); range 290 km (180 miles)



Above: A Lanchester armoured car in 1914 RNAS markings. These vehicles never gained the fame accorded to the Rolls-Royce armoured cars, but at the time were just as important in service. Many were later used in Russia from 1916 to 1917 with Royal Navy crews.

Right: Royal Navy Lanchester armoured cars in Russia during 1917. These vehicles motored thousands of miles in support of the Russians fighting the Germans and carried out scouting and raiding operations that covered many miles on all parts of the Russian front, including the Brisilov Offensive in mid-1917.

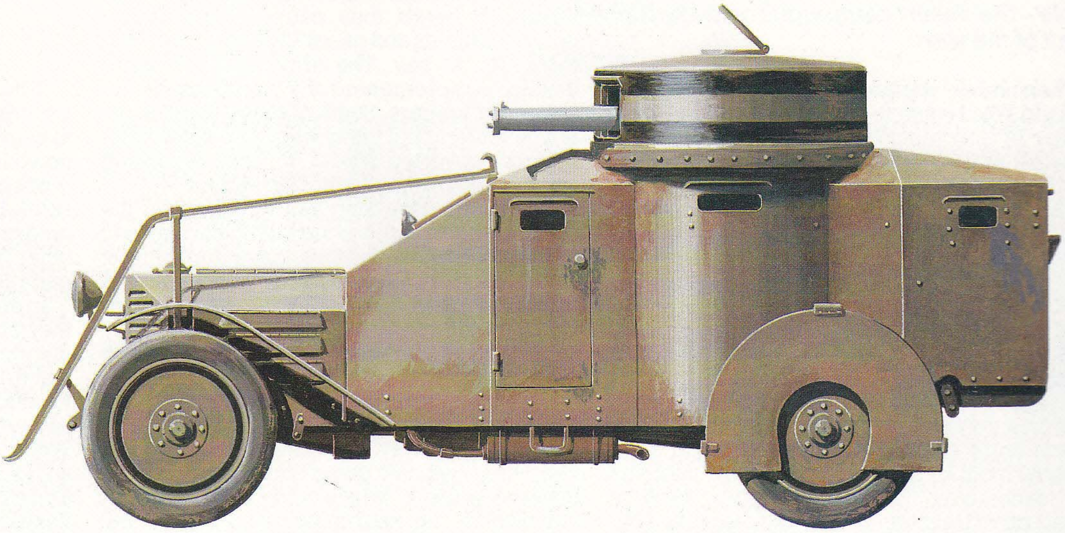
ITALY

Autoblindo Mitragliatrice Lancia Ansaldo IZ

The first **Lancia modello IZ** was not an armoured car but a small truck that mounted on the rear a form of expanding fireman's ladder which was used by 102-mm (4-in) artillery units for the observation of fire. While this was certainly a military function it was not long after, in 1915, that the truck was drastically adapted to become an armoured car known as the **Autoblindo Mitragliatrice Lancia Ansaldo IZ**. For its day the IZ was quite an advanced design. Its layout was conventional, with the engine forward and the main driver's position behind a fully armoured sloping plate. The main fighting compartment was in a box structure at the rear which mounted a squat round turret with a single machine-gun. On some later versions this turret arrangement was revised to accommodate a second but smaller turret on top of the first, enabling another machine-gun to be carried. A further variation that was almost universally adopted was to place two machine-guns in the lower turret so the IZ was quite heavily armed for a vehicle of its size.

Prominent on the IZ were the twin steel rails that extended from the driver's position to a point below and in front of the wheels. These rails were intended for wire-cutting. Later versions had even more protection against wire by an extension of the armour over the wheels both at the front and rear. Armoured shutters were used to protect the radiator at the front. Firing ports were provided around the top of the hull, and there was provision for another machine-gun at the rear of the hull. The rear of the hull also had provision for a rack to hold a bicycle if required. Maximum armour thickness was 9 mm (0.35 in).

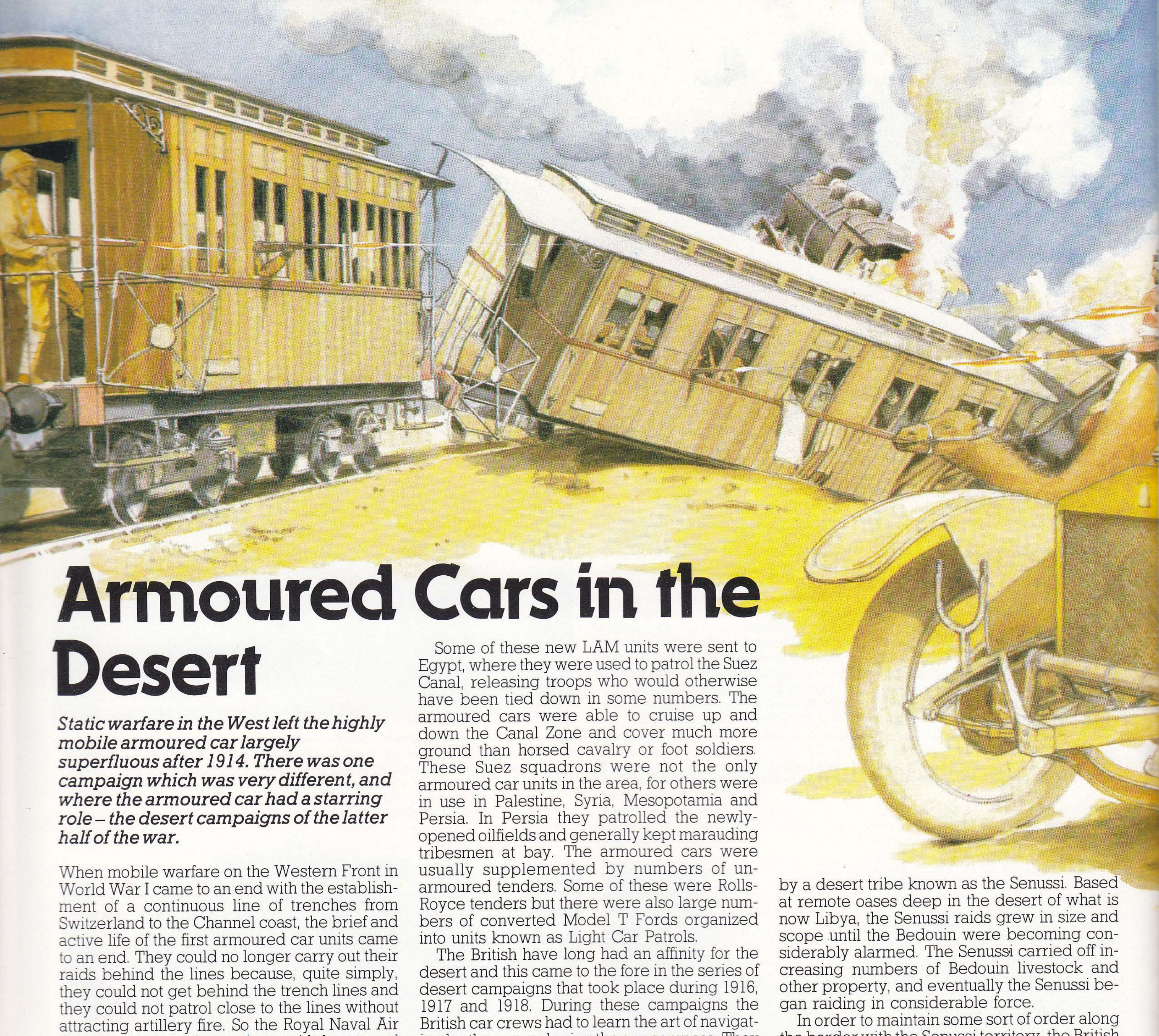
For much of the war the Italian armoured car units could contribute little to the campaigns against Austria-Hungary as most of the fighting took place in mountainous regions where wheeled vehicles had little chance to operate. A small force of 39 IZ armoured cars did a certain amount of reconnaissance along the Piave during the fighting along that front, and contributed to the limited period of fluid fighting in the aftermath of the Austro-German breakthrough of 1917. After that there was little enough they could do and some were sent over to North Africa for policing duties. By 1918 about 120 such cars had been produced, and these remained in use for some years thereafter. A few were handed over to Albania during the post-war period and long remained the sole equipment for the small armoured element of the new nation.



The Autoblinda Mitragliatrice Lancia Ansaldo IZ, one of the better armoured car designs of World War I, mounted a twin machine-gun armament in its circular turret. These cars proved to be remarkably durable; some were still in use during the Spanish Civil War of 1936-8 in Italian army hands.

Specification

Autoblindo Mitragliatrice Lancia Ansaldo IZ
Crew: 6
Weight: 3.8 tons
Powerplant: one 35/40-hp (26/30-kW) petrol engine
Dimensions: length 5.40 m (17 ft 8⅔ in); width 1.824 m (6 ft 0 in); height with single turret 2.40 m (7 ft 10½ in)
Performance: maximum speed 60 km/h (37 mph); range 300 km (186 miles)



Armoured Cars in the Desert

Static warfare in the West left the highly mobile armoured car largely superfluous after 1914. There was one campaign which was very different, and where the armoured car had a starring role – the desert campaigns of the latter half of the war.

When mobile warfare on the Western Front in World War I came to an end with the establishment of a continuous line of trenches from Switzerland to the Channel coast, the brief and active life of the first armoured car units came to an end. They could no longer carry out their raids behind the lines because, quite simply, they could not get behind the trench lines and they could not patrol close to the lines without attracting artillery fire. So the Royal Naval Air Service car squadrons were withdrawn and returned to the UK. Two squadrons were sent to take part in the Gallipoli campaign, but they never got a chance to do anything there, for by the time they arrived the small beach-head had been firmly contained by the Turks and there was no room for the Rolls-Royce armoured cars to manoeuvre. They were hidden away in shell-proof trenches and made no greater contribution to operations on the peninsula than to towing away barbed wire obstacles before an attack. After a while they were sent to Egypt.

Once in Egypt the Rolls-Royce armoured cars were handed over to the army, which had by then assumed control of the armoured car squadrons from the Royal Navy. The hand-over was made in August 1915, and the army reorganized its armoured car units into Light Armoured Motor (LAM) Batteries of the Motor Machine-Gun Corps. It also decided to standardize on one type, the Rolls-Royce, for not only would this mean that the army had a reliable vehicle but also that the spares and maintenance organization could be kept as simple as possible.

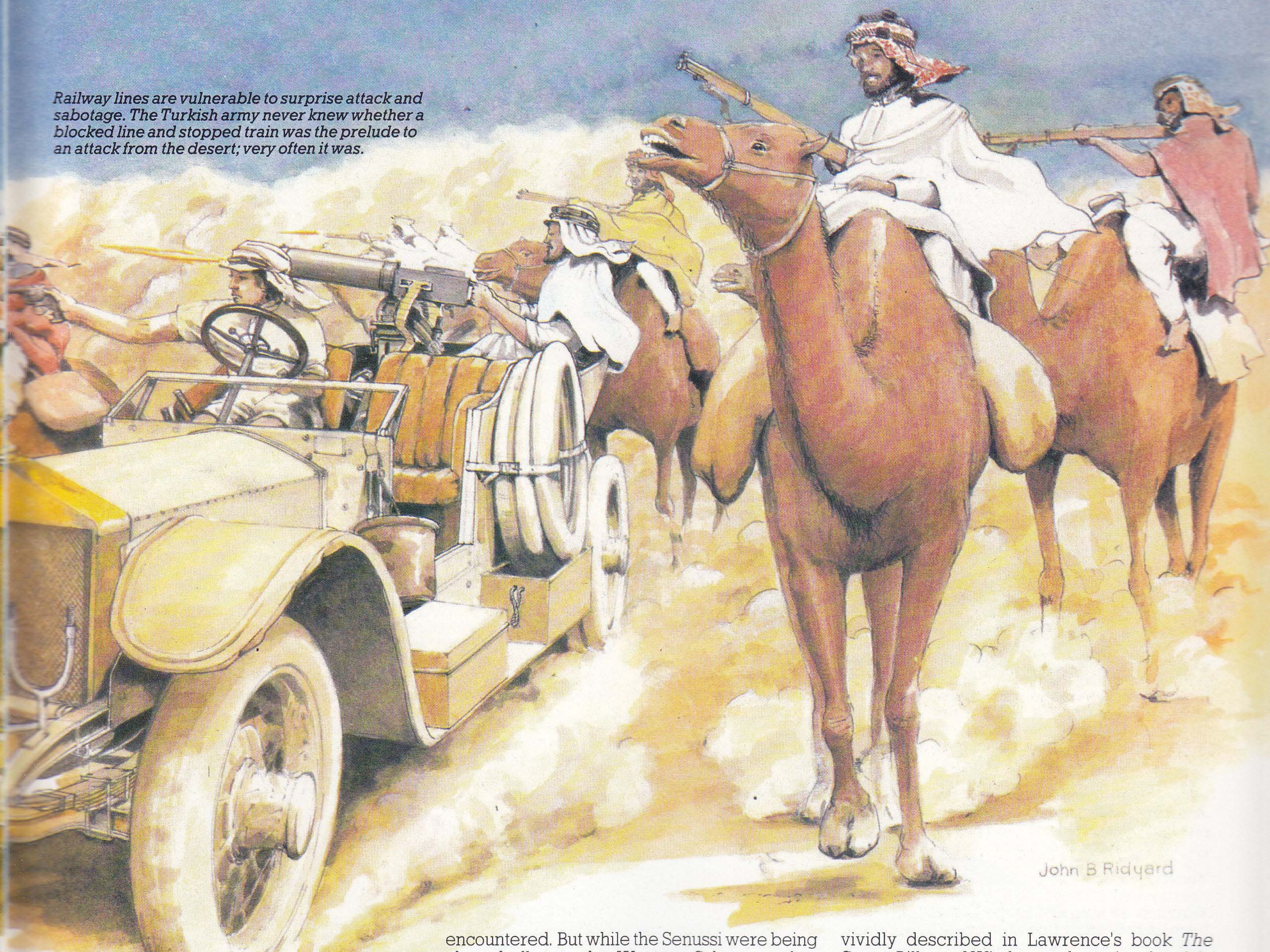
Some of these new LAM units were sent to Egypt, where they were used to patrol the Suez Canal, releasing troops who would otherwise have been tied down in some numbers. The armoured cars were able to cruise up and down the Canal Zone and cover much more ground than horsed cavalry or foot soldiers. These Suez squadrons were not the only armoured car units in the area, for others were in use in Palestine, Syria, Mesopotamia and Persia. In Persia they patrolled the newly-opened oilfields and generally kept marauding tribesmen at bay. The armoured cars were usually supplemented by numbers of unarmoured tenders. Some of these were Rolls-Royce tenders but there were also large numbers of converted Model T Fords organized into units known as Light Car Patrols.

The British have long had an affinity for the desert and this came to the fore in the series of desert campaigns that took place during 1916, 1917 and 1918. During these campaigns the British car crews had to learn the art of navigating by the sun and using the sun compass. They had to learn how to cross large areas of soft going using rudimentary sand channels, and the necessary art of vehicle recovery from seemingly impossible positions was discovered the hard way. The crews learned how to keep their vehicles going under all manner of desert conditions, which could vary from baking heat to the near-freezing in only a few hours. The armoured cars themselves were provided with some modifications to suit them to the local conditions. On the Rolls-Royces the armoured covers over the turret were removed and the radiator protection plates were locked in the open position. The Fords were often provided with a high pintle for a Lewis gun, so giving them a modest offensive potential.

In 1916 these preparations were put to excellent use. Many of the local tribes in the Suez Canal Zone were Bedouin nomads who were generally friendly towards the British and caused few problems other than the usual pilfering. But by the beginning of 1916 they were subjected to a series of raids carried out by a desert tribe known as the Senussi. Based at remote oases deep in the desert of what is now Libya, the Senussi raids grew in size and scope until the Bedouin were becoming considerably alarmed. The Senussi carried off increasing numbers of Bedouin livestock and other property, and eventually the Senussi began raiding in considerable force.

In order to maintain some sort of order along the border with the Senussi territory, the British decided upon the type of punitive operation that they had long practised on the North West Frontier of India. The LAM batteries were placed under the command of the Duke of Westminster, who set out into the desert as the advance element of a force mainly mounted on lorries. The first contact was made with the Senussi just over the Egyptian border but the tribesmen withdrew into the interior towards one of their two main bases at Siwa, some 320 km (200 miles) away.

On 14 March 1916 the duke's column of armoured cars, tenders and a truck carrying a single field gun was at the Halfaya Pass, a location that was to crop up again in military history some years later. Learning that the main force of the Senussi was not far away, the duke took a small force of nine Rolls-Royce armoured cars, a Ford with a machine-gun, and an open touring car. They soon encountered the Senussi force, which they discovered was at least 800 strong, and strengthened by some Turks and two small field guns. The resulting extended skirmish lasted two days, with the duke's tiny



Railway lines are vulnerable to surprise attack and sabotage. The Turkish army never knew whether a blocked line and stopped train was the prelude to an attack from the desert; very often it was.

force using their machine-guns to great effect, knocking out the Senussi artillery detachments in one of the very first attacks. Gradually the large Senussi force was broken up and its base camp was destroyed. The remainder of the force scattered in disorder but the small armoured car force had one more task to accomplish.

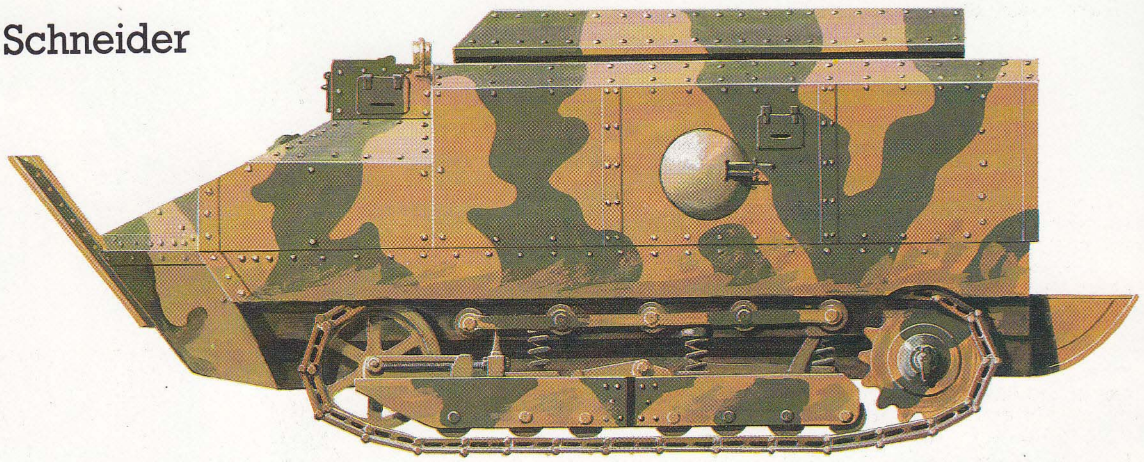
In the previous November an armed merchantman, the *Tara*, had been torpedoed just off the coast near Sollum Bay. As the survivors staggered ashore they had been captured by yet more Senussi who had borne them off into the desert to a camp at Bir Hakeim (another name that was to crop up in history again some years later). The duke's mobile column made its way to Bir Hakeim in yet another epic journey, but when it arrived the Senussi simply moved off into the desert leaving the *Tara* survivors behind. The exploits of this small campaign, culminating in the rescue of the survivors, was widely applauded in the United Kingdom and elsewhere, and even now it reads something like a story out of *Boy's Own*; but it all happened,

With the Senussi scattered the next few years were spent patrolling the Western Desert and rounding up any Senussi as they were encountered. But while the Senussi were being chased all over the Western Sahara another campaign was well under way east of Suez. There a campaign against the Turks was a more formal war, though for much of the time the lines of the Turks and Empire forces faced each other usually in a state of inactive stalemate. For both their inland flanks were a constant attraction to armoured car patrols, which in the British case carried out deep reconnaissance and other raids into the Turkish rear areas. Some of these raids were carried out with the active co-operation of Arab tribesmen who were carrying out their own insurrection against Turkish rule. Among them the now legendary Colonel T.E. Lawrence had long been operating, providing guidance and attempting to co-ordinate efforts. At times Colonel Lawrence was provided with armoured cars and tenders to use himself, and these small armoured car forays were sometimes provided with air support on a small scale, the tenders on occasion being used to keep these aircraft supplied on missions far from their home bases. It was a very open and extemporized form of warfare. Columns of Arab horsemen supported by armoured cars and armed tenders would swoop on isolated Turk outposts, kill and destroy, and then vanish back into the desert; all the tentative links with outlying garrisons were ambushed; and the few railway lines in the area were obvious and fruitful targets. The pattern of this fighting is vividly described in Lawrence's book *The Seven Pillars of Wisdom* and consisted mainly of blowing up trains or opening fire with machine-guns as the armed trains moved past. At times efforts were made to destroy bridges, and telephone links were cut as often as was possible. There were operations when the armoured cars acted on their own in small groups, and for these missions some form of local fire support was provided by a Talbot car that mounted a small mountain gun; but this extemporized mounting proved to be too heavy for its carriage and often gave trouble.

Some of the Rolls-Royce armoured cars involved in all this desert fighting proved to be reliable to a remarkable degree. Not only did they travel over vile terrain for much of the time, but often had to forego proper maintenance; yet they kept going for thousands of miles. Many survived for many years after the war, and a small number were still in use when 1939 came around. But by then the many lessons that had been learned of how to survive and operate in desert regions had been largely lost. Although the British remained in the Middle East between the wars and carried out many notable long-range operations using armoured cars, such activity was usually on a relatively small scale and there was never the element of action that made the British use their vehicles the way they were used in 1916-8. Thus after 1939 nearly all those lessons had to be relearned, very often over the same terrain.

FRANCE

Char d'Assaut Schneider



The Char d'Assaut Schneider proved less than effective when first introduced to the field. The short tracks and the long body combined to give a bad obstacle-crossing capability, even with the extra 'nose and tail' ramps. The armour was thin and the vehicle burned easily.

The basis of the **Char d'Assaut Schneider** (or Schneider CA) was developed under the aegis of General Estienne, who envisaged an armoured tractor to tow armoured sledges carrying troops across the Western Front batlefields in a surprise assault on German trenches. For the basis of his armoured tractor Estienne proposed using the track and chassis of the American Holt agricultural tractor which was then (1915) becoming widely used as an artillery tractor. By going direct to General Joffre, the French commander-in-chief, Estienne was able to obtain support for his proposal, and the armament concern Schneider became involved as the development agency.

The original proposals called for 200 Schneider CAs by the end of 1916, but development and production were so slow that it was not until the middle of 1917 that appreciable numbers were ready for use. The Schneider CA emerged as what was basically an armoured box mounted over a virtually unaltered Holt tractor suspension and track. The box mounted two machine-guns and a short 75-mm (2.95-in) gun to one side forward. The engine developed 55 hp (41 kW) and was fed from two petrol tanks that were situated near the machine-gun mountings. These tanks proved very vulnerable to enemy fire, to the extent that a single armour-piercing bullet could set the tank on fire, a fate that befell many Schneider CAs once they moved into action. Maximum armour thickness was 11.5 mm (0.45 in), increased to 19.5 mm (0.77 in) on late vehicles. The idea of the armoured personnel-carrying sledge had been dropped, and the Schneiders were used mainly for infantry support in the manner of the day. They proved to be less than successful in this role for their cross-country capabilities were severely restricted. By May 1917 some 300 had been produced, but thereafter the gun version was replaced in production by the **Schneider Char de Ravitaillement** stores-carrying version, on which the right-hand gun position was replaced by a door opening into the stores-carrying area. Extra 8-mm (0.31-in) armour was added to the sides of most examples as the result of experience in action, and perhaps the greatest contribution made by the Schneider CA was that as the result of hard experience the French army learned how to use and maintain armoured vehicles in the field. The French set up their first armour school at Champlieu in October 1916 and soon learned that lack of maintenance and lack of spares could remove a vehicle from the field as thoroughly as enemy action. Some of the early operations were fiascos as the result of lack of training and maintenance, typical of these being the attack on the Chemin des Dames in April 1917, when 76 out of a total of 132 Schneider CAs taking part were lost.

The last Schneider CA was delivered in August 1918, but by then attrition and a move towards the Renault FT 17 had reduced the numbers in service to under 100. Most of these were the unarmed supply version but the gun Schneiders had taken their part in a number of operations during 1918, enjoying a degree of success in some. But the Schneider CA was an unstable and indifferent performer on the Western Front and proved too prone to catching fire when hit. The best that can now be said of them is that they taught the French army a great deal about the limitations and possibilities of armoured warfare.

Specification
Char d'Assaut Schneider

Crew: 7
Weight: 14.6 tons
Powerplant: one 55-hp (41-kW) Schneider four-cylinder petrol engine
Dimensions: length 6.0 m (19 ft 8 in); width 2.0 m (6 ft 6⅔ in); height 2.39 m (7 ft 10 in)
Performance: maximum speed 6 km/h (3.7 mph); range 48 km (30 miles)

Schneider tanks move up to the front near L'Eglantiers on the Oise. The short 75-mm (2.95-in) gun was on the right of the superstructure, but one machine-gun ball mounting can be seen on this side. The crew are riding on top to avoid the uncomfortable heat of the engine inside.

FRANCE

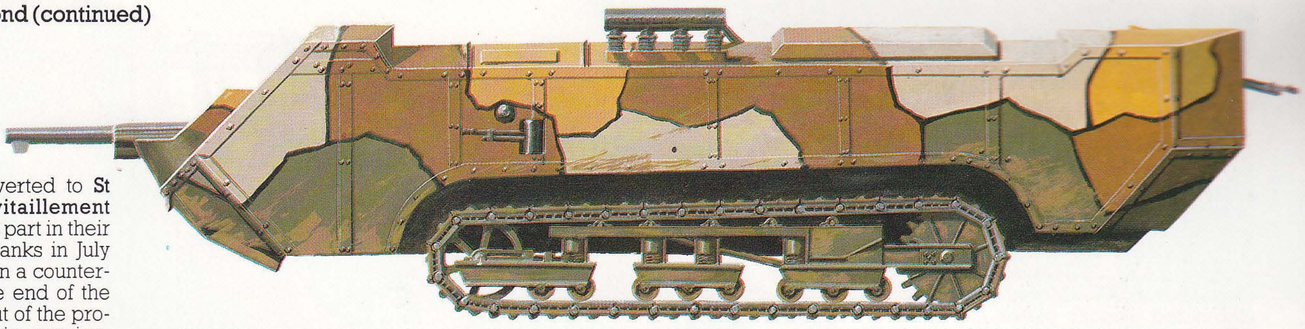
Char d'Assaut St Chamond

The development of the Schneider CA had by-passed the normal French army supply channels, which miffed some of the normal supply authorities to the extent that they decided to proceed with their own tank design. Using one Colonel Rimailho as the designer, the French army set about producing its own original design, and by early 1916 the first prototype had been built at the Saint Chamond factory at Homecourt, from which the new vehicle became generally known as the **Char d'Assaut St Chamond**. As with the Schneider CA, development and production were slow, so it was not until May 1917 that the first service examples were in action.

Even for a 'first try' the St Chamond CA had several unusual features. Like the Schneider CA it was based on the suspension, track and chassis of the Holt tractor, but on the St Chamond CA the track was lengthened to provide more track length on the ground. The drive to the track was unusual in that a petrol engine was used to drive an electric transmission. While this petrol-electric transmission worked, it was also a heavy and bulky system that meant the projected design weight was exceeded by over 5 tons. This overweight feature was not assisted by the configuration of the hull, which extended both forward and to the rear of the track to the extent that whenever the vehicle had to traverse rough ground or cross even the shortest trench it became stuck as the hull dug in. In service this proved a considerable drawback, for the Germans soon learned of the St Chamond CA's poor trench-crossing performance and widened their trenches accordingly. The St Chamond CA mounted a conventional Modèle 1897 75-mm (2.95-in) field gun in the front of the hull, and it was possible to mount as many as four machine-guns around the hull. Maximum armour thickness was 17 mm (0.67 in).

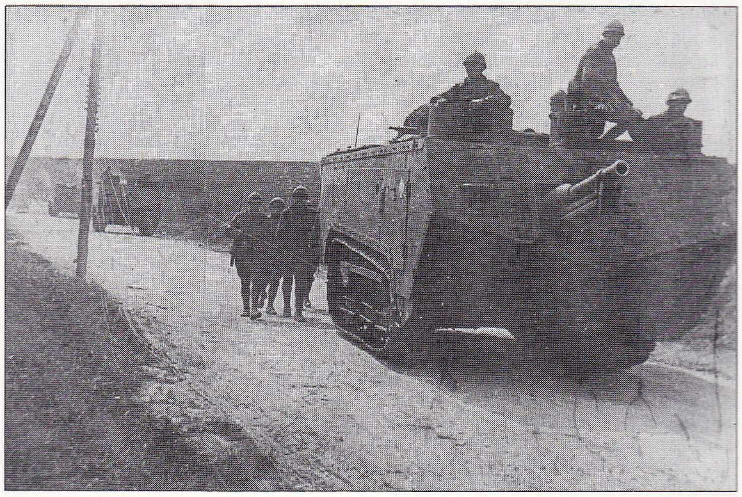
The poor cross-country performance of the St Chamond CA so severely restricted its use in action as 1917 progressed that the type was gradually replaced by the newer Renault FT

Char d'Assaut St Chamond (continued)



17, and many were converted to **St Chamond Char de Ravitaillement** supply carriers. They took part in their last major action as gun tanks in July 1918, when 131 took part in a counter-attack near Reims. By the end of the war there were only 72 out of the production run of 400 left in service. Although the St Chamond CA had many novel features that pointed the way ahead (the forward-mounted 75-mm/2.95-in gun, the petrol-electric drive and the lengthened track), it was basically an unsound design of poor cross-country capability, and in action proved to have only limited value.

Above: The Char d'Assaut St Chamond was even longer and clumsier than the Schneider, and the long hull so restricted its use in action that it was often relegated to the supply tank role. It had a powerful weapon potential, having four machine-guns and a 75-mm (2.95-in) gun, and had an advanced petrol-electric drive.



Right: Char d'Assaut St Chamond tanks move forward near Moyennville on the Oise in 1917. This picture provides a good indication of the great bulk and shape of these tanks compared with the limited length of track run; note also the limited ground clearance under the hull.

Specification

Char d'Assaut St Chamond
Crew: 9
Weight: 23 tons
Powerplant: one 90-hp (67-kW) Panhard four-cylinder petrol engine powering a Crochat-Collardeau electric transmission
Dimensions: length with gun 8.83 m (28 ft 11¾ in); length of hull 7.91 m (25 ft 11½ in); width 2.67 m (8 ft 9 in); height 2.34 m (7 ft 5⅔ in)
Performance: maximum speed 8.5 km/h (5.3 mph); range 59 km (36.7 miles)

FRANCE

Renault FT 17

The little **Renault FT 17** was without a doubt one of the most successful of all the World War I tanks. It had its origins in the proposals put forward in 1915 by the far-sighted General Estienne, who saw the need for a light armoured vehicle to support infantry operations directly. It was not until mid-1916 that Renault became involved and with a potential order for well over 1,000 examples in prospect the Renault company started to produce a design.

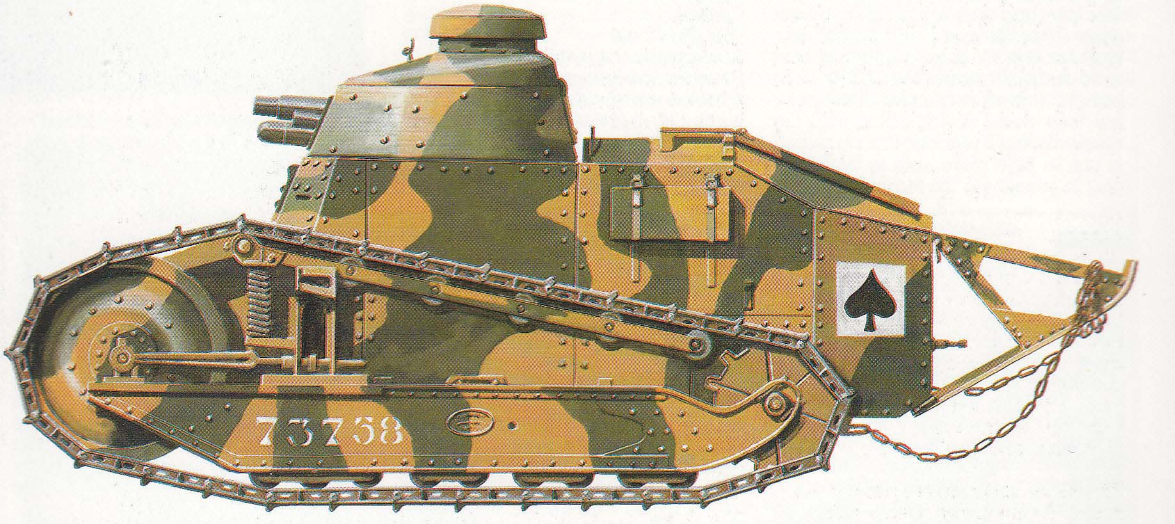
By the end of 1916 the design was ready. It emerged as a two-man tank armed with a machine-gun, and did not meet with general approval at the time. The design was considered too cramped and too lightly armed, but an order was pushed through, and it was not long before a further order for 2,500 was placed. By then the armament had been increased to a 37-mm gun, but many examples were produced with only a single machine-gun.

The FT 17 design was the first of what can now be seen as the classic tank design. It had its armament in a small turret with a 360° traverse, and the thin hull had the tracks on each side. There was no chassis as such, the components being built directly onto the armoured hull. The engine was at the rear, the tracks each had a large forward idler wheel that proved ideal for obstacle clearing, and to enhance trench-crossing capability a frame 'tail' was often fitted to the rear.

Renault were unable to produce the numbers required so production batches were farmed out to other concerns. Even the Americans became involved, but as they insisted that their FT 17s would be built to American standards and methods none arrived in France before the Armistice. In France the original cast armoured turret was often replaced on the production lines by an octagonal design using flat armour plates. The 37-mm gun became the virtual norm (**Char-canon FT 17**), although machine-guns could be fitted (**Char-mitrailleuse FT 17**). It was not long before a self-propelled gun version mounting a 75-mm (2.95-in) gun was produced as the **Char-canon Renault BS**, and there was even a special radio version, the **Char Renault TSF**. Maximum armour thickness was 16 mm (0.63 in).

The first FT 17s were delivered to the French army in March 1917 but it was not until May 1918 that they were first used in action. By then the French tactics were to use them en masse but this was not always possible in the face of the constant German attacks under way at that time. At first they were used in relatively small numbers, but by July things had settled down to the point where 480 could be concentrated for a counterattack near Soissons. Here they were successful, and thereafter the type was used to great effect. One constant worry was maintenance, for the FT 17 had been designed with little thought for repairs and long-term spares holdings, so at any one time hundreds were out of action with various faults. But many more were in the line as the various manufacturers duly delivered the ordered thousands. Some were passed to American troops. As the war ended there were 1,991 FT 17s fit for combat but another 369 were under repair and another 360 out of use.

After 1918 FT 17 remained in large-scale service and was produced or converted to suit a number of new roles such as mobile bridging, more self-propelled artillery, radio versions and so on. In 1939 there were still large numbers in use, and the Germans took over many after the French collapse of 1940. They retained some for their own use until 1944 when many were used by the Germans in the Paris fighting.



The Renault FT 17 was one of the most successful of the World War I tanks. They were produced in thousands, mainly as infantry support light tanks, but many other uses were found for them. Turret armament was either a machine-gun or a short 37-mm (1.45-in) gun, and it had a crew of two.

Specification

Renault FT 17
Crew: 2
Weight: 6.485 tonnes
Powerplant: one 35-hp (26-kW) Renault four-cylinder petrol engine
Dimensions: length with tail 5.0 m (16 ft 5 in); width 1.71 m (5 ft 7⅓ in); height 2.133 m (7 ft 0 in)
Performance: maximum speed 7.7 km/h (4.8 mph); range 35.4 km (22 miles)

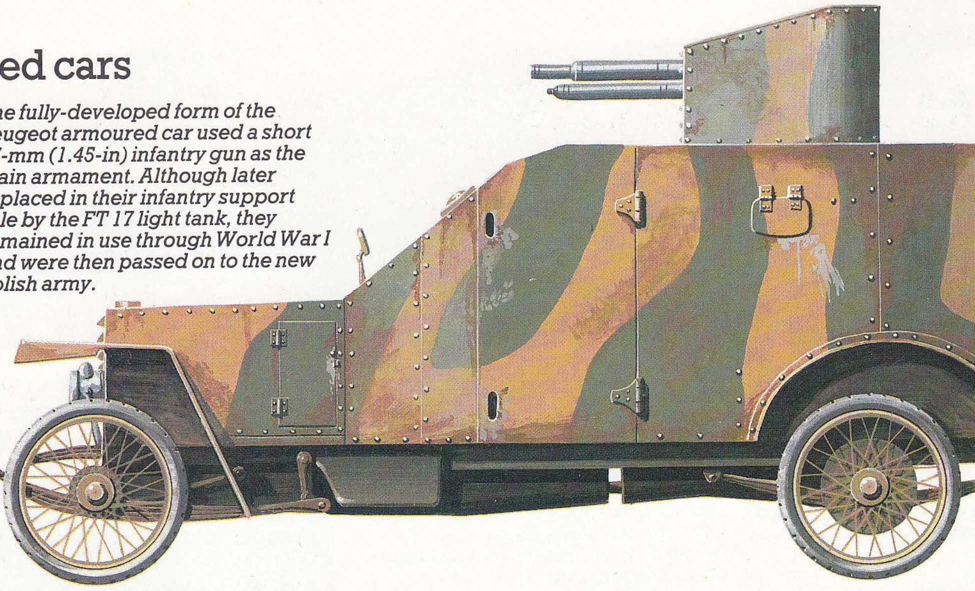
FRANCE

Peugeot armoured cars

The first **Peugeot** armoured cars were produced as rather hasty improvisations in 1914, and were typical of their period in that they were based on a commercial model, the 4×2 Peugeot 153. These early conversions used a centrally-mounted machine-gun on a pivot in the centre of the open rear body, but once the design had been formalized this armament was increased to a 37-mm gun. The early slab-sided armour plates (5.5 mm/0.216 in thick) were also revised to provide better all-round protection, but the top was left open.

By the time the purpose-designed Peugeot armoured cars were in service the vehicle scarcely resembled the early improvisations. A sloping armour plate now covered the driver's position and the engine was also armoured. The radiator was protected by steel shutters but the wheels remained as they originally were with their wire spokes, even though the extra weight caused by the armour was partially balanced by the use of dual wheels at the rear. Although a machine-gun could be carried on the central pintle, the more usual weapon was a 37-mm gun behind a curved steel shield. This gun was a half-size version of the famous Modèle 1897 field gun, and could fire a useful high explosive shell. This gave the Peugeot armoured car a modest firepower potential that was sometimes used to support infantry attacks. An alternative to the mix of a 37-mm gun and a machine-gun was a pair of machine-guns. After the end of 1914 there was little enough for these armoured cars to do on the Western Front. A few were used for patrols to the rear of the front, but they could do little else until the relatively small number that remained in use in 1918 were able to take their part in containing the large-scale German breakthroughs that occurred on some parts of the line. Thereafter a few were used in the relatively fluid warfare that developed. But most of this fighting was carried out by tanks, particularly the FT 17s which prove to be of more use over rough country than the Peugeots with their narrow wheels.

When the war ended the French army still had 28 Peugeot armoured cars in service, but most of these were later handed over to Poland, where they remained in use for some years.



The fully-developed form of the Peugeot armoured car used a short 37-mm (1.45-in) infantry gun as the main armament. Although later replaced in their infantry support role by the FT 17 light tank, they remained in use through World War I and were then passed on to the new Polish army.

Specification

Autoblindé Peugeot

Crew: 4 or 5

Weight: 5 tons

Powerplant: one 40-hp (30-kW) Peugeot petrol engine

Dimensions: length 4.80 m (15 ft 9 in); width 1.80 m (5 ft 11 in); height 2.80 m (9 ft 2¼ in)

Performance: maximum speed 40 km/h (25 mph); range 140 km (87 miles)

A French army Peugeot armoured car provides fire support for British infantry near Meteran during the Battle of the Lys in April 1918. In such flat open country these armoured cars were able to provide useful fire support with their gun, but they were often restricted to the available roads.

GERMANY

Sturmpanzerwagen A7V

For a nation that was normally well to the fore of military technology, Germany was surprisingly slow in appreciating the potential of the tank and, despite some early and far-sighted proposals put forward by various individuals, no interest was taken in any form of armoured vehicle other than armoured cars. That was rectified soon after the first British tanks had made their debut on the Somme battlefields, when a committee was formed to design and produce a German equivalent.

Like so many other designs produced by a committee under time constraints the result of this venture was not a great success. The vehicle became known as the **Sturmpanzerwagen A7V**, the A7V coming from the committee's departmental abbreviation. The design was based on that of the readily-available Holt caterillar track and suspension, but Joseph Vollmer did introduce some suspension modifications to the original that improved the possible speed, these efforts being negated by the location on the basic chassis of a large armoured box structure that held a crew of no fewer than 18 men. This box had large slab sides with nose and tail arrangements that extended under the body to such an extent that the ground clearance was only about 40 mm (1.57 in). The length of track on the ground was also rather short and the overall result was a vehicle that was inherently unstable and with a very poor cross-country performance. The main armament was a captured 57-mm Russian gun (mounted at the front) and six machine-guns, each with a crew of two. The one advantage the A7V had over the British tanks was the armour thickness used, ranging from 10 mm (0.39 in) to 30 mm (1.18 mm). By the time production had begun the Germans had developed their own armour-piercing ammunition, and the A7V's armour was proof against this new projectile.

The first A7V was ready by October

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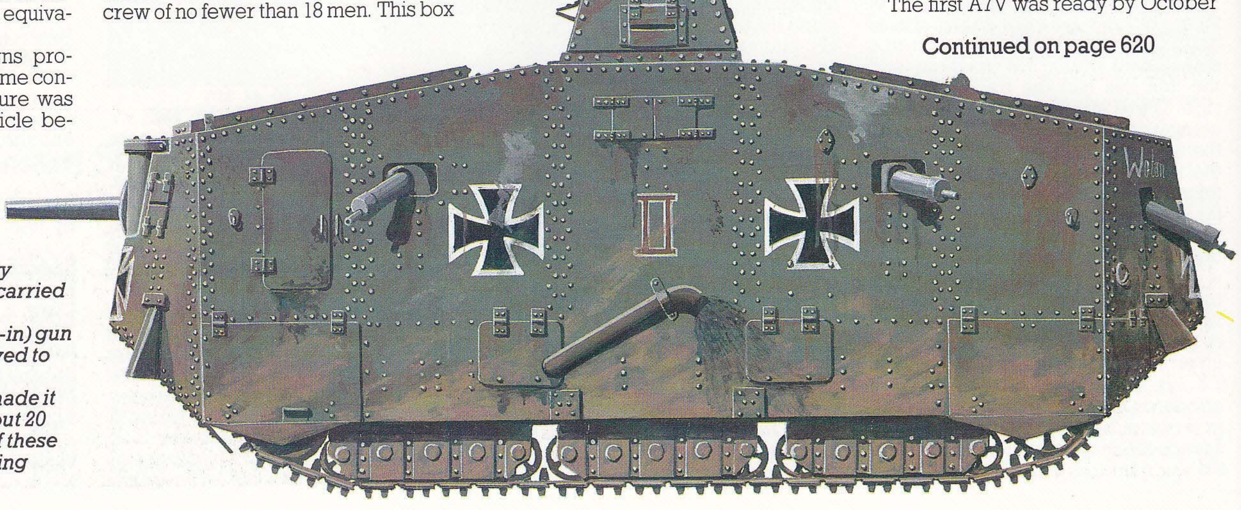
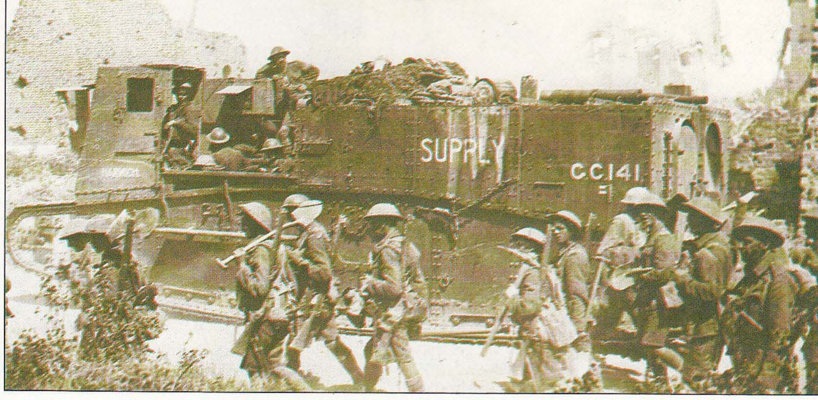


The A7V was a large and bulky vehicle with a crew of 18 and carried six machine-guns. The main armament was a 57-mm (2.24-in) gun in the front hull. The A7V proved to have a poor cross-country performance and its height made it rather unstable, and only about 20 were ever produced. Many of these were pressed into action during 1918.

The Specials

Following the introduction of the tank to the shell-smashed battlefields of the Western Front, it became obvious that armour and infantry had to be supported and supplied across no-man's land. Yet no lorries or logistic vehicles could handle the terrain. The problem was, what could keep up with a tank?



A Gun Carrier Tank ('Harwich'), with its intended transportable gun removed, is being used as a supply tank near Arras in August 1918. These tanks were mainly used to transport ammunition, as each could carry 200 152-mm (6-in) shells, replacing a carrying party of 300 men. Even so, such employment was a waste of their potential as artillery carriers.

One of the features of armoured fighting vehicle design is that almost as soon as a tank is designed it is converted to carry out no end of special purposes. The same thing happened in the years before 1918, for no sooner had the first Mk Is been issued and put in service than they were converted for all manner of other roles.

These other roles usually involved working with the tanks themselves, and many of the conversions made during the early days were made by the troops in the field. The very first of these conversions was to alter Mk I, Mk II and Mk III vehicles from gun tanks into supply tanks. Among the early experiences gained on the Somme battlefields was that when the tanks went forward with their supporting infantry, the securing of an objective (if it were reached) meant that surviving tanks were in need of fuel, ammunition, food and water. As the tanks were the only means of crossing the ravaged ground, it was tanks that had to carry all this despite their limited internal volume.

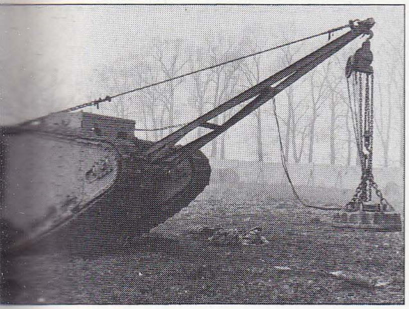
Thus the supply tanks were created simply by removing the armament from some vehicles and using the space for supplies instead. To add to the load that could be carried a cargo tray was slung between the tracks at the rear and experiments were carried out with towed sledges. In a very short time these supply tanks became an integral part of tank operations on the Western Front, and at Amiens the idea was taken one stage further: if supplies could be carried, why not men? The Mk V* tanks were specially lengthened to increase obstacle-crossing capability, and as a bonus there was more internal space. At Amiens it was decided to carry machine-gun teams to take up positions on the forward objectives and as a result some of the tanks in the first waves carried up to 10 extra men plus their machine-guns. The experiment was not a success, for the heat and fumes inside the tanks proved too much for the unprepared soldiers who were deposited at their allotted locations in no fit state to do anything other than recover. The experiment was not repeated, a later generation of armoured vehicles being needed to bring it to fruition.

The supply tank concept became so accepted that special vehicles were designed for the role. This was the Mk IX supply tank, commonly known as the Pig. It could carry up to 10 tons of stores or (a carry-over from the Amiens experiment) up to 30 men instead of stores. They never got a chance to prove themselves, for the first such vehicle did not arrive in France until October 1918 and took no part in any of the fighting.

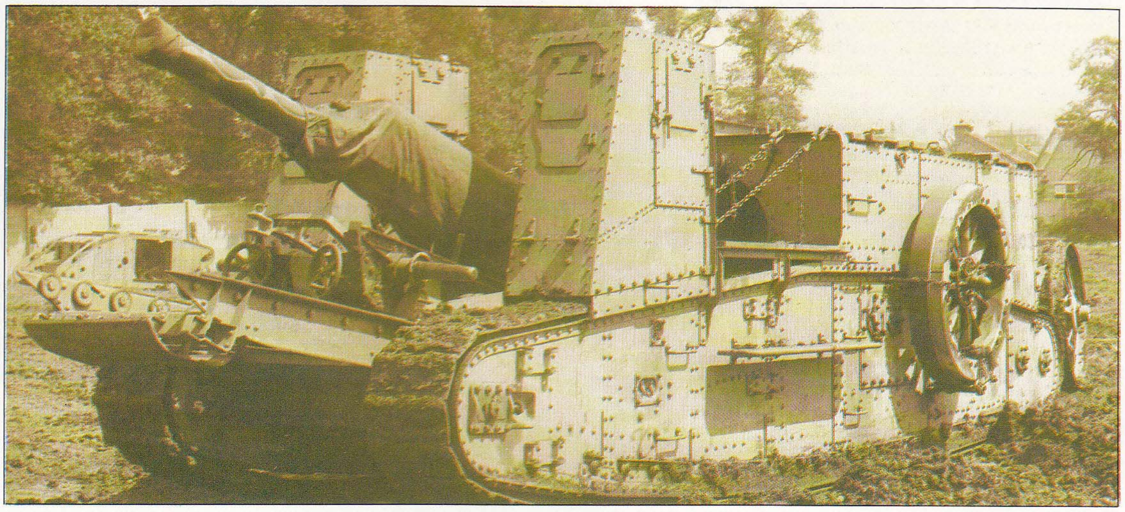
Another special tank that came to nothing was the Gun Carrier Tank Mk I. It was developed for the simple reason that the artillery of the day could not be hauled across the rough ground of the Western Front battlefields without a great deal of difficulty. As any advances had to be provided with fire support, the guns had to be got forward somehow to hold any territory that might be won, and this often took too long, the inevitable counterattack being launched before the guns were in position. It seemed that a possible answer lay in carrying the guns on some form of tank and depositing them once they were at their chosen position. Accordingly a special design was put forward in October 1916 and the first example arrived in France in July 1917.

This Gun Carrier Tank Mk I used the mechanical interior of a Mk I allied to a long and low track. The gun, either a 60-pdr or a 152-mm (6-in) howitzer, was carried slung between the two front track horns. The wheels were removed and slung on the vehicle sides and the driver and brakesman sat in two armoured boxes set well forward in front of the gun. The old steering tail of the Mk I tank was retained. A total of 48 of these gun carriers was ordered, and some were used in the 3rd Battle of Ypres; they were little used apart from that. On at least one occasion a carrier was used to carry a 152-mm (6-in) howitzer along various sectors of the front and fire a few harassing rounds, but that was all. Instead the gun carriers were used as supply tanks, carrying forward ammunition. The concept of using the vehicles as gun carriers was simply too novel for the time.

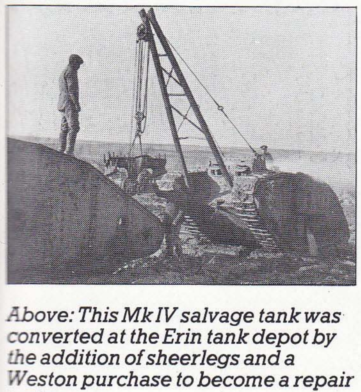
A few Mk Is and some other of the early tank marks were fitted with crane jibs or lifting gantries at some of the huge base workshops that sprang up behind the Allied lines, and a very few were fitted with radios to supply battle information to the rear during actions.



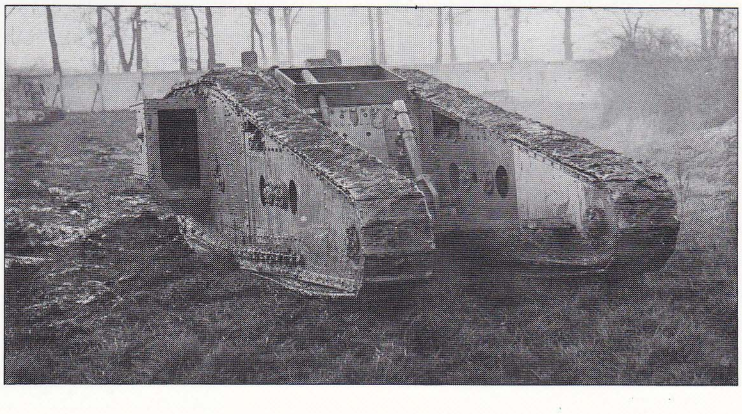
Above: This unusual experiment with a Mk IV tank is using an electromagnet on a 3-ton crane jib to clear unexploded ammunition from the path of intended advances or from ranges. This Mk IV was a salvage tank with its armament removed, and was probably converted at the Erin tank depot.



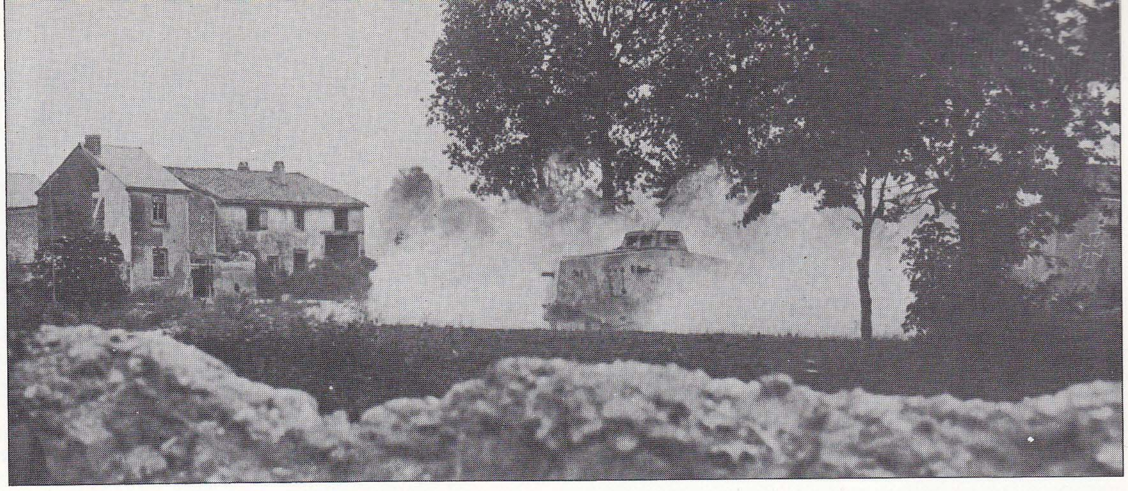
Above: The Gun Carrier Tank Mk I used the engine and power train of a Mk I tank allied to a new and longer track. It carried a 60-pdr gun or a 152-mm (6-in) howitzer with the wheels removed and slung on the sides. Despite its potential, this tank was little used in its intended role.



Above: This Mk IV salvage tank was converted at the Erin tank depot by the addition of sheerlegs and a Weston purchase to become a repair tank.



Right: This Mk IV has a 'tadpole tail' fitted to improve trench-crossing performance. A platform was added between the tails to increase rigidity, and could be used to carry stores such as the 152-mm (6-in) trench mortar shown here. These tails proved to be unsatisfactory and were not widely used.



Two A7Vs as seen from a sector of the French lines in June 1918. The cloud of smoke came mainly from the twin Daimler-Benz petrol engines, but some was no doubt dust thrown up by the tracks. Some of the machine-guns are visible, but the main 57-mm weapon is obscured in the smoke.

1917, and in December that year 100 were ordered. Production of the A7V involved several firms, all of them already hard put to meet existing production requirements, with the result that by the end of the war only about 20 A7Vs had been produced. In March 1918 the first A7Vs went into action. When used over good going as mobile fire support units they proved successful enough, but over rough ground they proved to be less than successful and some of the first examples soon revealed shortcomings in their special armour plate. The A7V's lack of trench-crossing ability often left the tank behind the infantry it was supposed to support, and all too often when opposed by field artillery firing over open sights the type was easily knocked out.

Three A7Vs took part in the first tank-versus-tank combat on 24 April 1918. This took place at Villers-Bretonneux when three Mk IVs (one Male and two Females) encountered three A7Vs. The two Females were soon damaged and had to retire but the sole Male was able to hit and knock out one of the A7Vs. More tank-versus-tank combats took place later before the Armistice, but the A7Vs rarely shone. In fact the Germans favoured the various British tanks they were able to capture in place of the A7V, mainly because of the poor cross-country performance of the latter.

Despite the slow production of the A7V the Germans produced an unarmoured supply version with an open top, the **Uberlandwagen**, and even went so far as to attempt to produce the **A7V/U** version with the 'all-round' tracks and sponsons of the British tanks. This venture came to naught, as did the **A7V/U2** and **A7V/U3** projects, the former having smaller sponsons and the latter being a 'female' version armed only with machine-guns.

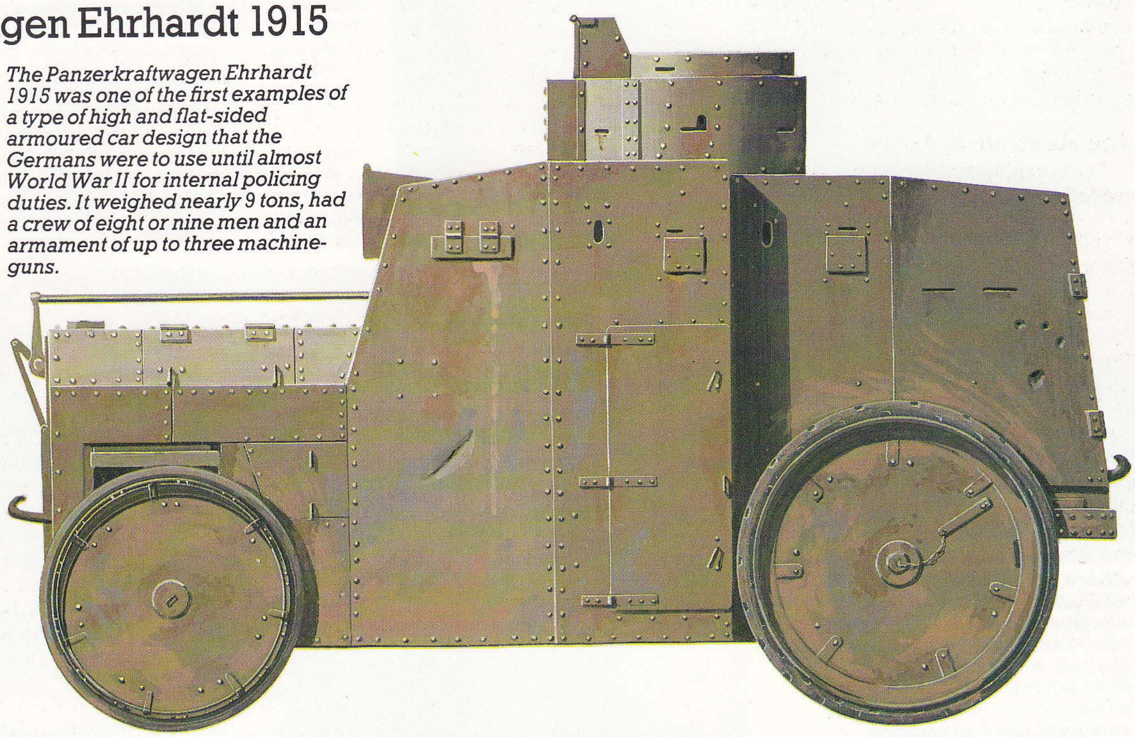
Post-war a few took part in the internal German power struggles and a few more were used by the new Polish army for some years.

Specification

Sturmpanzerwagen A7V
Crew: 18
Weight: 33 tons
Powerplant: two 100-hp (74.6-kW) Daimler petrol engines
Dimensions: length 8.0 m (26 ft 3 in); width 3.06 m (10 ft 0½ in); height 3.30 m (10 ft 10 in)
Performance: maximum speed 12.9 km/h (8 mph); range 40 km (25 miles)

GERMANY

Panzerkraftwagen Ehrhardt 1915



The Panzerkraftwagen Ehrhardt 1915 was one of the first examples of a type of high and flat-sided armoured car design that the Germans were to use until almost World War II for internal policing duties. It weighed nearly 9 tons, had a crew of eight or nine men and an armament of up to three machine-guns.

The very first German armoured cars were in fact special large car or truck chassis adapted to carry a skyward-looking artillery piece for use against observation balloons. There were several of these weapons, collectively known as *Ballon Abwehrkanonen* (BAK), but although some were used for army trials none was taken into large-scale use. It was left to the Belgians in 1914 to demonstrate to the Germans the potential of the armoured car in warfare when the latter were hindered by the hit-and-run raiding carried out by the Minervas and other converted touring cars. The Germans, having suffered somewhat at the hands of the Belgians, decided to produce their own equivalent but having no practical experience of their own to fall back upon approached the design problems in typically Germanic style.

During 1915 the Germans produced prototypes of three different armoured cars. The manufacturers were Ehrhardt, Daimler and Büssing, who all chose to ignore the fact that the Belgian cars were little more than converted touring cars and went instead for what they thought were more suitable vehicles. All three turned out to have one feature in common, in that they were massive. The largest of the three was the Büssing, which used a 'double-ended' layout that could at least boast a high ground clearance. The other two designs were roughly the same and had the armoured engine at the front and a large box-like body at the rear with a turret or cupolas on its top. They were both high clumsy-looking vehicles that were far too heavy for their operational tasks. Some indication of this fact is provided by the knowledge that the Daimler and Ehrhardt designs each had to use double wheels on each side at the rear. All three cars had a crew of eight or nine men and carried at least three machine-guns. Maximum armour thickness was 7 mm (0.28 in).

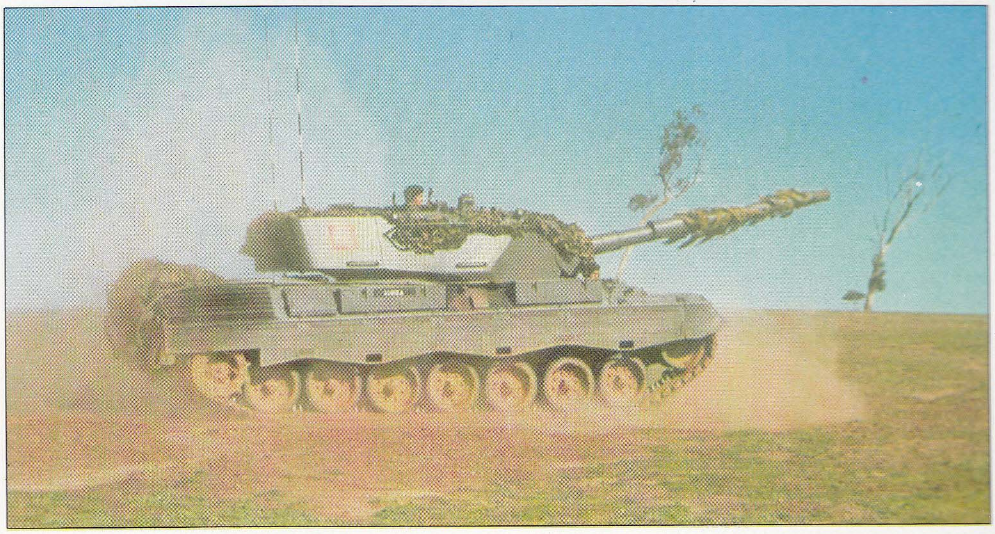
The three prototypes were formed into one unit along with some improvised conversions and sent at first to the Baltic and then to the Western Front. Conditions on both fronts were such that the armoured cars could do little, and eventually they were sent to Russia where they could at least use their mobility to some effect. It was at this stage that more cars were needed, and as Büssing and Daimler were already overextended on war work, Ehrhardt received the contract, being asked to produce a further 20 armoured cars. These were 1.72 tons lighter than the original **Panzerkraftwagen Ehrhardt 1915**. This batch, known as the **Panzerkraftwagen Ehrhardt 1917**, had revised frontal armour, and the vehicles were sent to the Eastern Front until the end of the fighting there in 1917. Thereafter they appear to have kept within Germany for internal policing duties, in which role they were so successful that a further 20 were produced specificially for the purpose in 1919. The Ehrhardt design was in fact considered just what internal policing required for its height was such that it towered above crowds and enabled police units to control riots and the like that much better. Vehicles of the Ehrhardt type were in use until World War II.

The requirement for armoured cars was such that by 1918 the Germans were forced to employ numbers of captured Rolls-Royce and other such vehicles, and the Ehrhardts, clumsy and high though they were, were never around in sufficient numbers. On the Eastern Front the small numbers involved were never able to make much impression, so the design is now little known and few operational details have survived.

Specification

Panzerkraftwagen Ehrhardt 1915
Crew: 8 or 9
Weight: 8.86 tons
Powerplant: one 85-hp (63.4-kW) petrol engine
Dimensions: length 5.61 m (18 ft 5 in); width 2.0 m (6 ft 6½ in); height not known
Performance: maximum speed 59.5 km/h (37 mph); range 250 km (155 miles)

Australia



Australia's single armoured regiment is equipped with the West German Leopard 1A3 tank (known as the Leopard AS1 in Australia). Based at Puckapunyal, north of Melbourne, the total Leopard strength is 103.

Australia is one of the few nations in the world today that faces no likelihood of invasion or of being involved directly in an armed conflict. Nevertheless Australia is an enormous sub-continent rich in resources and other wealth, and is thus involved in the well-being of the Asian nations to its north and north west. Thus relatively small but highly-trained regular forces are maintained to protect the national interests and to enable the nation to play a part in the various treaties and agreements that Australia has undertaken. Chief of these is the 1971 Five-Power Agreement that relates to the defence of Malaysia and Singapore. Australia is a major partner in this agreement, to the extent that a number of air force units are maintained in Malaysia and Singapore. Other Australian armed forces are in the Sinai as part of the United Nations force, and a small contingent is maintained in Papua New Guinea. Training groups are stationed in Malaysia and Singapore, and there are others in Indonesia and the Philippines.

The Australian armed forces are almost entirely regular in composition, but a sizable reserve force is maintained with training obligations to expand the numbers in service in an emergency. Equipment is in the main modern but is selected primarily to suit conditions in the Australian terrain in which it will be used rather than for the usual NATO standard requirements. A national defence industry is well established and supplies a fair proportion of the supplies and equipment used.

The Australian Army

For everyday functioning the Australian Army is divided into three commands (Field Force, Training and Logistics) and seven military districts that are loosely based on the state boundaries. Field Force Command includes the operational units, the main formation being the 1st Division with its three brigades: the 1st Brigade at Holsworthy, the 3rd Brigade at Townsville and the 6th Brigade at Brisbane. The 1st Brigade is described as a 'heavy' formation with most of the army's mechanized and armoured units. The 3rd Brigade is a 'light' formation earmarked as the Operational Deployment Force (ODF) for rapid deployment at short notice. The 6th Brigade is a conventional infantry brigade and like the others has two battalions. There are various support battalions including the usual engineer, signal, transport, and aviation formations, but there is only one armoured unit, the 1st Armoured Regiment based at Puckapunyal, north of Melbourne. This regiment is equipped with the West German Leopard AS1 (the Leopard 1A3), of which Australia has 103. To back these up there are five cavalry regiments (four of them reserve), one armoured personnel carrier regiment and three independent reconnaissance squadrons, all equipped with the M113 APC. Of these 790 M113s some 63 have been converted to fire-support vehicles, 48 with 76-mm (3-in) Scorpion turrets and 15 with 76-mm (3-in) Saladin turrets.

The three artillery regiments are currently equipped with 34 ex-British 140-mm (5.5-in) gun-howitzers and 227 American 105-mm (4.13-in) howitzers, but these are scheduled to be replaced by the 155-mm (6.1-in) M198 howitzer from America and the ROF 105-mm (4.13-in) Light Gun from the United Kingdom. Some of the Light Guns will be produced in Australia. There is a single air-defence regiment using Rapier SAM launchers and a useful number of Redeye shoulder-launched SAMs. A single aviation regiment uses mainly 16 Pilatus Porter aircraft, but some 11 locally-built GAF Nomad transport are used along with a fleet of 47 Bell 206B-1 helicopters. There is also a sizable fleet (87 in all) of LARC-5 amphibious vehicles.

Infantry weapons include the locally-produced 7.62-mm L1A1 rifle, the local 9-mm F1 sub-machine gun, the 7.62-mm M60 general-purpose machine-gun and the 84-mm Carl Gustav anti-tank wepon.

There are six regular infantry battalions and 14 reserve battalions. Most of the reserve battalions are part of the 2nd Division, based in Sydney and comprising two understrength brigades. An odd composite force is NORFORCE, based in the north of the country and formed from a mix of local reserve/resident units and the army's regular special Air Service regiment.

Total manpower strength of the army is 32,850, and there are trained reserves of 30,300.

The Royal Australian Navy

The Royal Australian Navy has relatively recently suffered the deletion of its flagship, HMAS *Melbourne*, and as she was the RAN's only aircraft-carrier this has led to the loss of much of the fixed-wing element of the Fleet Air Arm. Most of the aircraft based on the ship have now either been passed to the air force or placed into store, leaving a fixed-wing element using six Grumman S-2G Trackers and two BAe HS 748 ECM aircraft. Most of the other Fleet Air Arm aircraft are six Westland Sea Kings used by one ASW helicopter squadron, and a mix of 16 Westland Wessexes, four Bell UH-1Bs and four Bell 206s operated by one SAR/utility helicopter squadron. Some of these existing helicopters are scheduled to be replaced by a small force of six Aérospatiale Ecureuil helicopters and two more Sea Kings, but many will remain in use for many years to come.

With the aircraft-carrier gone, and with no replacement in prospect, the largest ships in service are three 'Perth' class ASW destroyers equipped with Standard and Ikara guided missiles. There are six 'Oberon' class submarines and two 'FFG-7' class frigates. Next down the line are six 'River' class frigates equipped with Seacat missiles, and a small fleet of 20 large patrol craft. Mine warfare is confined to two special craft, one a hunter and the other a sweeper. For amphibious operations there are six tank landing craft and one large amphibious transport vessel. Other support vessels include two training ships, a destroyer tender and one fleet tanker.

Australian submarine forces consist of six British-designed 'Oberon' class diesel patrol boats, based at HMAS Platypus, Neutral Bay, Sydney. HMAS Otway, seen entering Sydney Harbour, is typical, and has been refitted with new electronics and Harpoon anti-ship missiles.

Equipment on order includes Harpoon anti-ship missiles, two more 'FFG-7' class frigates, six more large patrol craft and two mine-countermeasures catamarans.

The main Royal Australian Navy bases are at Sydney, Melbourne, Jervis Bay, Brisbane, Cairns, Darwin and Cockburn Sound. Total regular manpower is 17,150, but there are only 1,200 trained reserves who operate their own flotilla of five patrol craft and a single tank landing craft.

The Royal Australian Air Force

The main striking power of the Royal Australian Air Force is invested in two strike and reconnaissance squadrons operating 24 General Dynamics F-111 swing-wing aircraft. Types in service include the F-111C (16), F-111A (four) and RF-111C (four). There is also a force of 56 Dassault-Breguet Mirage IIIO interceptors divided between three squadrons. Two of these squadrons are based in Malaysia and Singapore, though one of these squadrons is scheduled to be withdrawn to Australia in the near future. Some of the F-111s are scheduled to be supplemented and eventually replaced, as are the Mirage IIIOs, by a purchase of 75 McDonnell-Douglas F/A-18A Hornets that should be delivered to the air force starting in late 1984.

The other main combat units are two maritime reconnaissance squadrons, one with 10 Lockheed P-3B Orions and the other with 10 P-3Cs, although another 10 P-3Cs are on order which will be enough to form another squadron.

One unusual air force unit is the single forward air controller squadron, which is equipped with six locally-produced Commonwealth CA-25 Winjeels. This unit is used to support army operations, as are the five transport squadrons, which operate a mix of aircraft types. Two squadrons operate 24 examples of the Lockheed Hercules (C-130E and C-130H variants). Two more squadrons operate a mix of 19 de Havilland Canada DHC-4 Caribou fixed-wing aircraft and four Bell UH-1B helicopters. There is also a single VIP-type squadron that operates two BAC One-Elevens, two BAe HS 748s and three Dassault-Breguet Mystère 20s. Also included with the transport force is a single flight of four Boeing 707-338Cs, but these are scheduled for conversion into tanker aircraft to support the F/A-18A Hornets once they enter service. Other transport aircraft include two helicopter utility squadrons with 35 UH-1B/Hs and one medium transport helicopter squadron equipped with the Boeing Vertol CH-47 Chinook. Eight Chinooks are used, with a further four kept in reserve. Training aircraft include 51 NZ Aerospace CT/4 and CT/4A basic trainers, 74 Aermacchi M.B.326H intermediate and advanced trainers, eight HS 748 multi-engine trainers and 15 Mirage IIIOD conversion trainers.

On order are 12 Aérospatiale AS 530 Ecureuil helicopters for general utility purposes, and a number of Harpoon missiles are also on order to provide the P-3 Orions with an anti-ship capability.

Although not, strictly speaking, part of the Australian armed forces, the Australian Bureau of Customs maintains its own small fleet of 10 GAF Searchmaster maritime search aircraft, and these could be used by the armed forces in an emergency.

Air force reserves number about 1,200 and these are formed into eight auxiliary squadrons scattered around the various states of the nation. Regular strength is 22,475.

Order of Battle

Army
three infantry brigades, each with two battalions
one armoured regiment
one cavalry regiment (reconnaissance)
one armoured personnel carrier regiment
four artillery regiments (two field, one medium and one air defence)
one field engineer regiment
one construction regiment
one field survey regiment
five signal regiments
one Special Air Service Regiment
one aviation regiment
one transport regiment
one transport air support regiment

Army reserves
14 infantry battalions
four cavalry regiments
188 field, support, logistic and training units
one commando battalion
one regional surveillance force (NORFORCE)

Royal Australian Navy
three 'Perth' class anti-submarine missile destroyers
six 'Oberon' class submarines
two 'FFG-7' class missile frigates (two more on order)
six 'River' class frigates
20 large patrol craft (six more on order)
two mine warfare vessels (two more on order)
six tank landing craft
one amphibious transport ship
one destroyer tender
two training ships (one destroyer and one ex-ferry)
one fleet tender

Royal Australian Air Force
two strike/reconnaissance squadrons (F-111C, F-111A and RF-111C)
three interceptor squadrons (Mirage IIIO)
one forward air control flight (CA-25 Winjeel)
two heavy transport squadrons (C-130E/H)
two medium transport squadrons (DHC-4 and UH-1B)
one VIP transport squadron (BAC One-Eleven, HS 748 and Mystère 20)
one tanker/transport flight (Boeing 707-338C)
two utility helicopter squadrons (UH-1B/H)
one medium transport helicopter squadron (CH-47C Chinook)
one operational conversion unit
training units

The Royal Australian Air Force is acquiring 75 McDonnell Douglas F/A-18 Hornets for delivery commencing in 1984. These aircraft will augment and eventually replace both General Dynamics F-111s and Dassault Mirage IIIs in Australian service.